

modern machine shop

PUNCH PRESS
SAFETY
See Page 104

SELECTING STEELS
FOR MACHINABILITY
See Page 118

SHAPING KEYS
See Page 126

APRIL
1956

OK multi-operation tools—more beef in the body



*One man,
one machine,
one pass,*

*now does the work of six.
A winning combination to reduce costs . . .*

*OK modern milling cutters
mounted on modern milling machine*

THE OK TOOL COMPANY, INC.
Milford, New Hampshire

The logo for The OK Tool Company, Inc., consisting of the letters "OK" in a bold, sans-serif font, all contained within a diamond-shaped frame.

Decision at SPS

STANDARD PRESSED STEEL CO.
JENKINTOWN, PENNA.



A moment of decision . . . after months of trial, weeks of conference . . .

It's ADAMAS . . . again . . . and it's no surprise that Adamas tungsten carbide is specified at SPS . . . for Adamas tungsten carbide products are subject to the world's most rigid set of quality control procedures.

Careful selection of materials lies at the heart of quality control at SPS. And, at SPS, where carbide is called upon for use in a great variety of applications, Adamas tungsten carbide is a logical choice . . . for there's an Adamas carbide grade for every job.

ADAMAS CARBIDE CORPORATION
KENILWORTH, NEW JERSEY

Standard Pressed Steel Company of Jenkintown, Pennsylvania is the world's largest manufacturer of Socket Screw Products, Cap Screws, Set Screws and a variety of other threaded fasteners. These SPS products are used on aircraft, home appliances, business machines, in fact, wherever products or components must be held together.

A continuing program of research and development at SPS assures a lasting place for the Company in America's future.



APRIL
1956
Vol. 28
No. 11
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modern machine shop

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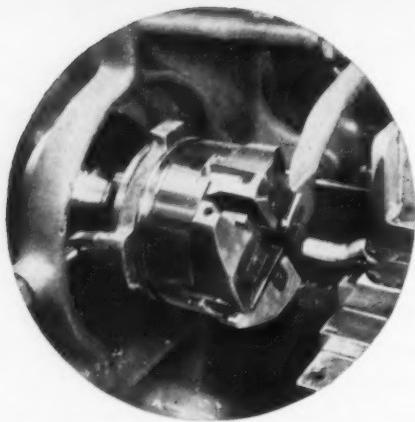
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Published monthly and copyrighted (1956) by Gardner Publications, Inc., 431 Main St., Cincinnati 2, Ohio.
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opposite pages 32 and 372.)



Faster Turning Using 4 Cutting Tools *Simultaneously*

By turning, facing, and chamfering on Landis Threading Machines, automotive parts production at Thompson Products in Detroit has been substantially increased. This LANDIS Hollow Milling technique makes large output increases possible by applying a number of simultaneously-functioning cutters, thus multiplying the feed rate of a single tool.

The illustration shows one of these parts, steering links, being turned and faced on a LANDMACO Double-Spindle Lead-screw Threading Machine. SAE 1040 steel forgings are turned (1/32" stock removal) $1\frac{1}{8}$ " in length and faced by four special turning cutters in $\frac{7}{8}$ " V LANCO Hardened and Ground Heads. Production regularly averages 200 pieces per hour, with the $\frac{5}{8}$ " turned diameter held within

$\pm .004"$. Four hours' production is obtained between cutter grinds.

This LANDIS technique offers important advantages over other methods of turning, forming, and facing. The use of four or six simultaneously-functioning cutters, in addition to increasing production, reduces tool cost and workpiece spoilage to the minimum. The diametrically-opposing cutters evenly distribute cutting-strains and maintain proper work alignment. LANDIS Cutters, available in a wide variety of styles, are economical for they are usable for most of their length with only a simple regrinding of the rake angle.

Additional information will be sent on request—please include specifications when writing.

LANDIS Machine COMPANY

394 WAYNESBORO • PENNSYLVANIA • U. S. A.

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Compare this latest jig borer for
capacity accuracy speed!



New **KNIGHT'S**
Jigmaster

Last word in medium size jig borers
 —unequalled for extreme accuracy,
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The totally enclosed spindle and quill
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 moving in a solid bearing . . . the extra-wide base and
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 the wider bearing surfaces . . . all contribute
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Any one of three table and
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SPECIFICATIONS

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Table Travel—Longitudinal	20"
—Cross	15"
Vertical Capacity	23"
Throat	20"
Weight	7500 Lbs.

W. B. KNIGHT MACHINERY COMPANY
 3922 West Pine Blvd.

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April, 1956

modern machine shop 3



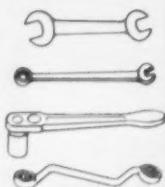
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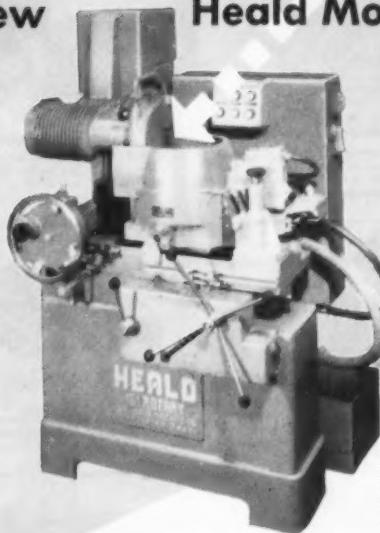
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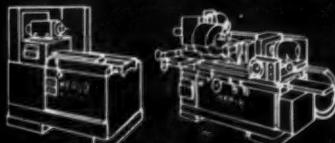
Subsidiary of The Cincinnati Milling Machine Co.

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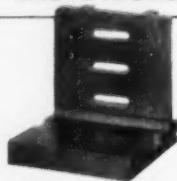
PARALLELS



Box Parallels

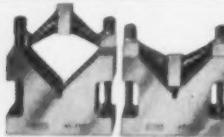
Made of finest quality close grained cast iron. All sizes are parallel within .00025" in 6 inches, square within .0005" in 6 inches. Will pair up within these limits.

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Multiplex Angle Irons

Save time by permitting a single setup of workpiece for many machining and inspection operations. All working surfaces scraped square within .0005" in 6", parallel within .0005".



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Steel Parallels

Made of alloy steel, hardened and ground on four sides. Exceptionally durable and free from seasonal changes. Not made to be used as squares.



Duplex Angle Irons

Finished inner pads increase accuracy, speed setup work and durability. Eliminate need for table clamping. Inner pads parallel to sides within .0005". Outer faces square within .0005" in 6".



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Hole in center permits quick, accurate setups. Also provides clearance for tool in drilling and boring. Made of alloy steel, hardened and ground on all working surfaces. All sides square within .0001". Sold singly or in pairs.



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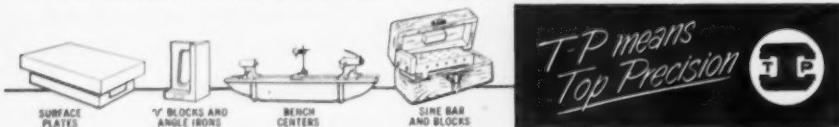
Made of finest quality cast iron. Width and thickness held within plus or minus .0005". Square within .0005" in 6 inches. Parallel within .0005" in total length.



Measuring Irons

Provide a fixed surface for measurements. Narrow width makes it convenient for clamping work on the machine table. Front face and bottom finished square within .0002" per foot.

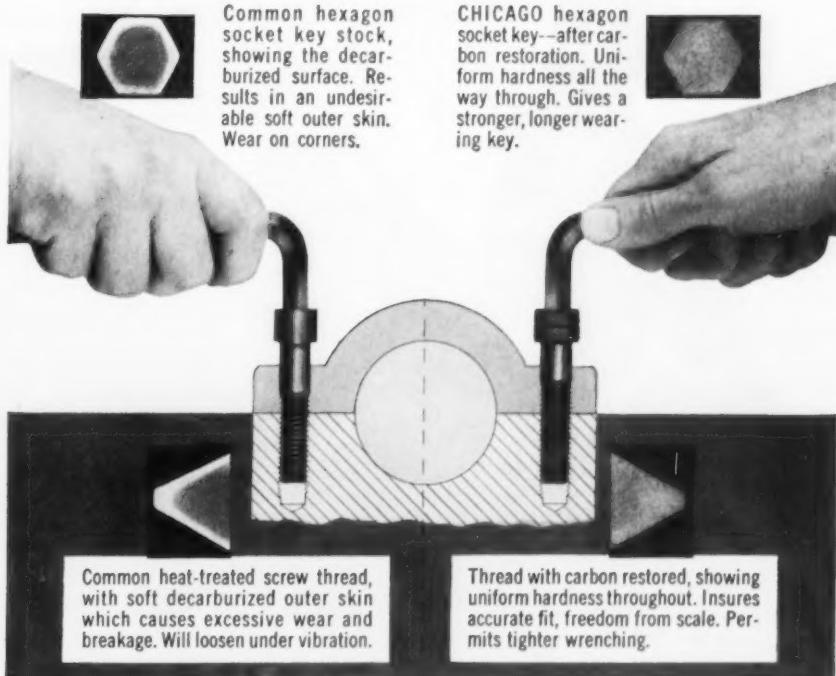
For the complete story on these items and many more send for your copy of the Taft-Peirce Handbook.



THE TAFT-PEIRCE MANUFACTURING COMPANY, WOONSOCKET, RHODE ISLAND

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How carbon affects fastener performance



Screw fasteners may look identical, but the microscope reveals wide differences in their ability to "take it".

Steel hardness depends on the precise amount of carbon in its structure. But during steel manufacture this vital surface carbon is inevitably lost. Result (shown above) is a soft, decarburized outer skin in the finished fastener, causing thread stripping, fatigue failure, excessive wear, or loosening under vibration.

The soft "decarb" layer is eliminated

CHICAGO hexagon socket key—after carbon restoration. Uniform hardness all the way through. Gives a stronger, longer wearing key.

by The Chicago Screw Company's unique "Carbon Restoration" process in which surface carbon is replaced during heat treating. The process is precisely controlled to give uniform hardness from core to surface.

All Chicago "Safety-Plus" Socket Screw Products and heat-treated cap screws have the benefit of *Carbon Restoration* plus complete quality control from start to finish. For full information and catalog, write our Standard Products Division.

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**For Quickest Action
in Cutting Metal and Costs . . .**

NE



A high cubic removal job ($\frac{1}{4}$ " depth of cut, 19 ipm feed) . . . milling the sides of heavy machine tool part on a new CINCINNATI® No. 5 Plain Dual Power Dial Type Milling Machine.



CINCINNATI

CINCINNATI HIGH POWER and DUAL POWER DIAL TYPE MILLING MACHINES

Primarily, you're cutting costs when you step up cubic removal of metal. And you have plenty of opportunity to remove metal as rapidly as the work and fixture will permit when you assign the job to a new CINCINNATI® High Power or Dual Power Dial Type Milling Machine. These new knee types are tops in cutting capacity; tops in easy, convenient operator control; tops in low maintenance expenses. You'll be interested in the "vital statistics" shown in the table below. ¶Cost-reducing possibili-

ties of the High Power and Dual Power Dial Types include 24 spindle speeds . . . 32 feeds (% to 90 ipm) . . . full power to the spindle with independent feed drive motor . . . single lever, power selection of speeds and feeds. Horizontal machines are equipped with Dynapoise overarms to reduce self-excited chatter . . . plain and vertical machines are equipped with automatic table cycles. Write for new catalog No. M-1917-1; or look in Sweet's Machine Tool File for brief specifications.

**THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO**

Sizes	No. 3	No. 4	No. 5	No. 6
Styles	Plain	Plain	Plain	Plain
	Univ.	Univ.	*Univ.	
	Vert.	Vert.	Vert.	Vert.
Table travel	34"	42"	50"	60"
<hr/>				
Motor drives:				
Spindle (H.P.)	20 hp	25 hp	25 hp	25 hp
(D.P.)	30 hp	50 hp	50 hp	50 hp

*No. 5 Universal available in High Power Machine only

Power draw-bar attachment reduces the cost of this 12-operation job on No. 4 Vertical Machine. ➤



MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

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LOW PRICED MOLY for HIGH GRADE TOOLS?



SENTRY FURNACES employing the positive Sentry Diamond Block atmosphere harden all high speed and air hardening steels including the low-priced molybdenum steels, consistently without spoilage, true to size and completely free from scale or decarburization.

Many users of Sentry equipment

are regularly hardening the M-10 and other "difficult" steels with absolutely no "decarb" — producing high quality tools from lower cost steels.

Like the manufacturer of the above shown struck slot hammer, you, too, can save money with a Sentry installation.

Consult Sentry for free demonstration hardening on your own tools.



Request
Catalog
L-17

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Sentry ELECTRIC FURNACES



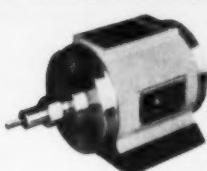
THE SENTRY CO. • FOXBORO • MASS.

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"over 14 billion revolutions and still going strong"

"50% more wheel life" "better surface finish"

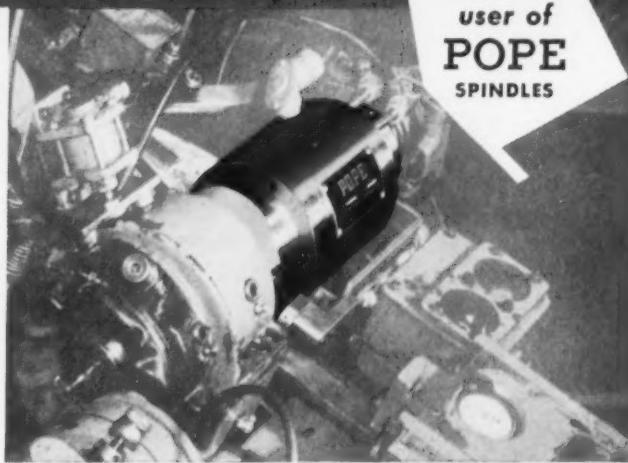
"way better wavometer readings"



**THIS IS THE
SPINDLE**
for Quick, Low Cost
Maintenance

You can disassemble, replace the bearings, reassemble and get this spindle back into operation in less than one hour, without removing the spindle housing from its set-up position — another cost-saving feature of Pope Hi-Cycle Spindles.

This rugged, long-lived Pope Spindle has the rigidity, both radially and axially, for continuous production of accurate parts. Spindles of similar design available for higher speeds.



says this
user of
POPE
SPINDLES



**THESE ARE THE
BEARINGS**

A pair of Fafnir Super-Precision MM201W1-CR spring loaded ball bearings are used in the Pope Hi-Cycle Wheelhead.

THE FAFNIR BEARING COMPANY operates POPE Heavy Duty, 72,000 RPM Hi-Frequency Wheelheads on No. 1 Landis Grinders for extra precision ball bearing race grinding.

Fafnir considers the extraordinary record of these POPE wheelheads in their own plant an outstanding example of both *spindle* performance and *bearing* performance, for complete Fafnir ball bearings are used in these Wheelheads.

What about *your* grinding operations? Do they call for fine surface finishes, uniformly dependable performance and trouble-free operation over long periods? If so, you need the engineering ingenuity and skilled craftsmanship, and the precision ball bearings, that you'll find in POPE Precision Spindles.

Write for specifications and quotations

No. 105

Specify

POPE

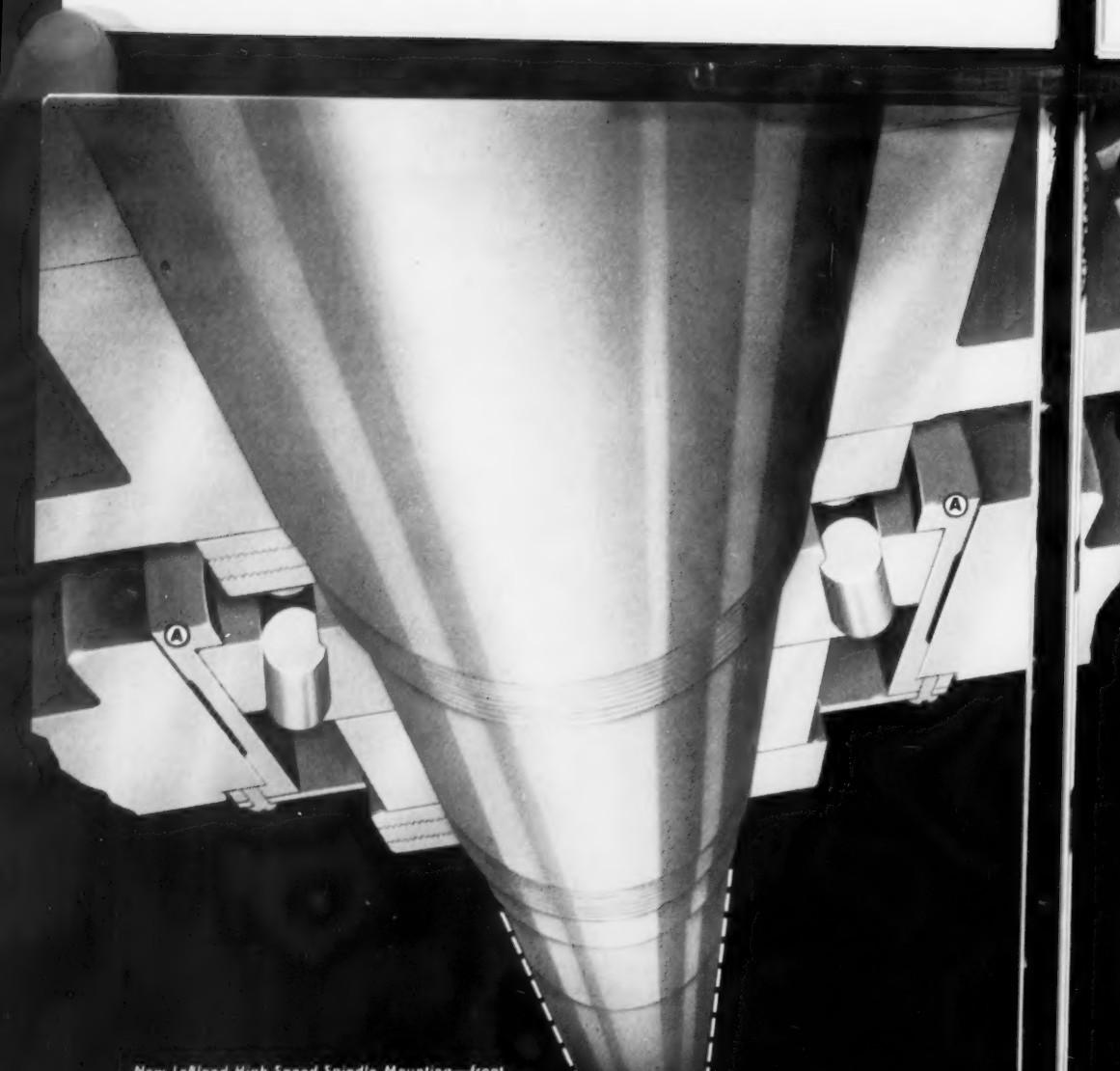
PRECISION SPINDLES

POPE MACHINERY CORPORATION

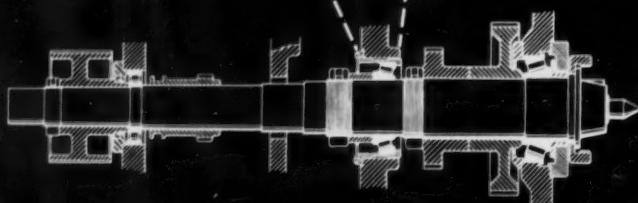
Established 1920

201 RIVER STREET HAWTHORNE, MASSACHUSETTS

For more data circle 210 on Reader Service Card



New LeBlond High Speed Spindle Mounting—front and center bearings are Timkens in cone-adjusted mountings. Center bearing cup is mounted in special adaptor which relieves potential excessive preload resulting from the heat of high speed operation. Rear mounting is thrust bearing.



before you buy a lathe for high-speed carbide turning... check spindle bearing design

LeBlond construction gives you safe high speeds with long-lived precision. Higher and higher speeds for efficient carbide turning—that's the order of the day in lathe design. But when you talk about 2000 rpm on a 16" H.D. lathe, you've got to think about the new problems created by high speeds.

Heat, generated in a hurry, produces different rates of expansion radially and axially in the bearings and spindle. As a heavy spindle is revved up to 2000 rpm, heat is generated in the bearings. Expansion occurs radially in the bearings and spindle before the heat has time to dissipate and cause a proportionate axial expansion in the spindle. *This is the dangerous interim period!* Unless the bearings can be relieved, excessive preload may cause undue wear and loss of precision. Even failure in the extreme case.

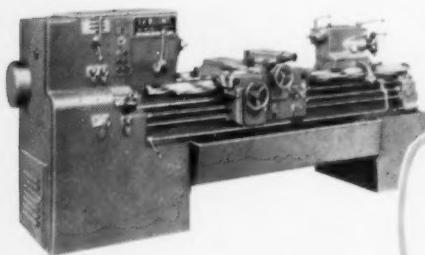
Here's how LeBlond solves this problem. The front Timken bearing is mounted on the spindle and directly in the headstock. The center

bearing cup is mounted in an adaptor^A whose land is .004" smaller in diameter than the headstock bore. The other end of the adaptor is press fitted. As the bearing temperatures rise in operation, the center bearing and adaptor expand radially into the slight clearance. Both front and center bearings are thus relieved from extreme preload—failures due to excessive tightness and wear are eliminated. The original factory-set preload can handle both high and low speeds—no need to reset bearing adjustments in the field.

This is typical of the under-the-surface quality engineered into every detail of LeBlond Lathes. To give you the operating speeds you need, with the safety, precision and long life you expect when you purchase a LeBlond.

Whatever your turning needs, high speed, high horsepower or high production, LeBlond has a lathe in its complete line to do the job. 76 different models to choose from. See your LeBlond Distributor or write today.

Other important features of the new LeBlond 16" Heavy Duty Lathe include combination gear-belt drive headstock, 18 geared speeds, 9 timing-belt-driven speeds up to 2000 rpm, free running spur gear design, four-way rapid traverse, one-piece apron, totally-enclosed quick-change box, hardened and ground steel bedways, thrust-lock tailstock. Ask for Bulletin HD-126E.



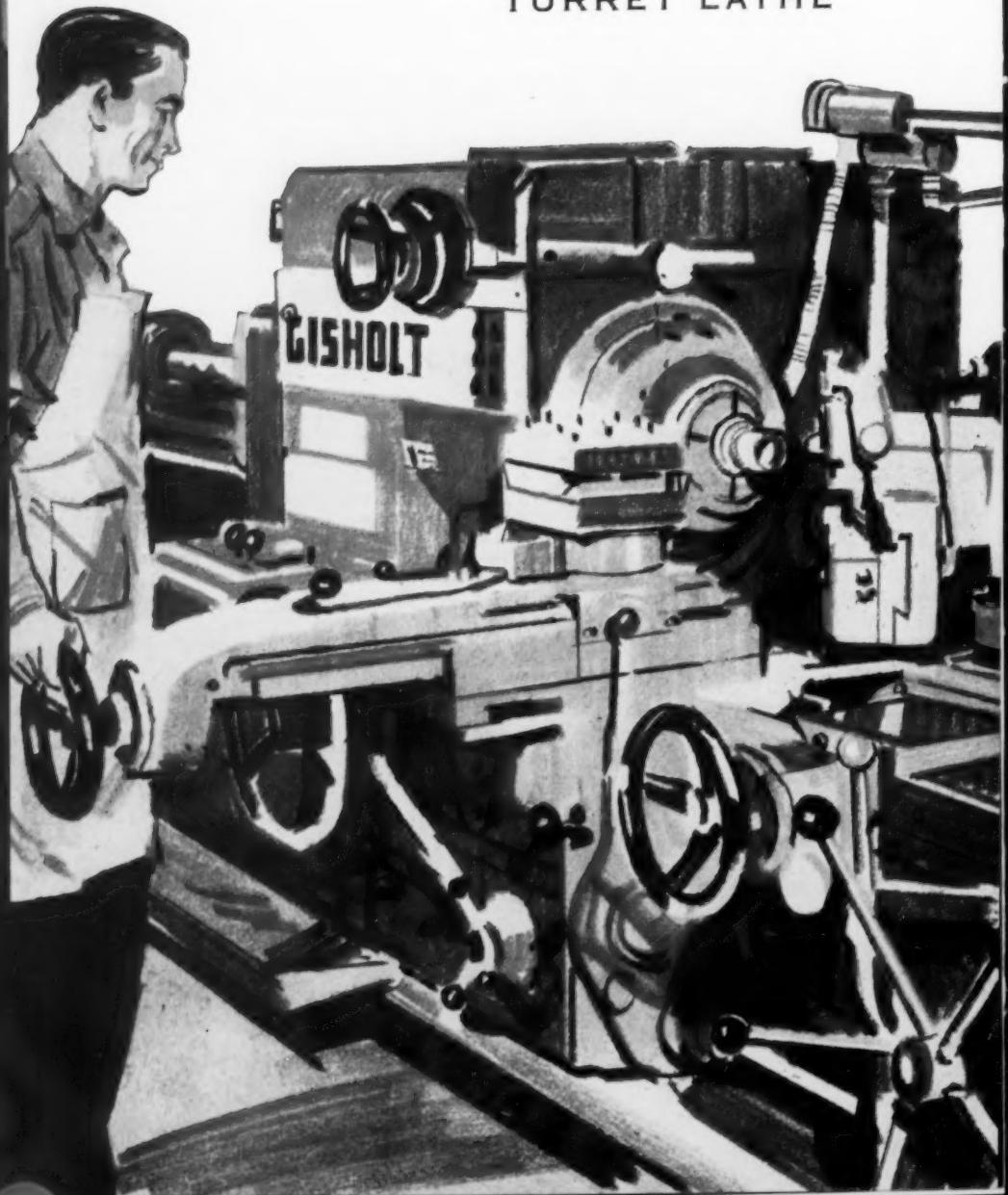
... cut with confidence

LeBLOND
of Cincinnati

THE R. K. LEBLOND MACHINE TOOL COMPANY • CINCINNATI 8, OHIO

World's Largest Builder of a Complete Line of Lathes • for more than 69 years

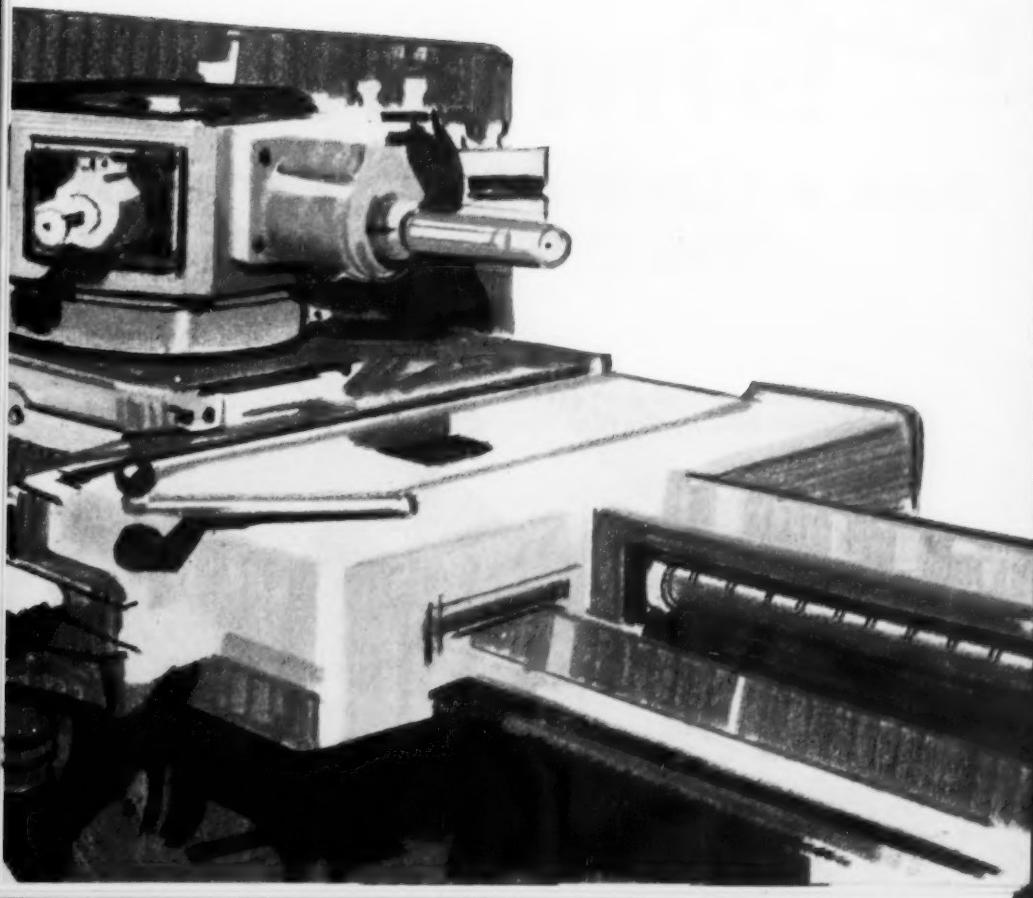
GISHOLT MASTERLINE
SADDLE TYPE
TURRET LATHE





Throughout the metalworking industry, Gisholt High Production Saddle Type Turret Lathes are known for simpler controls, ease of operation, wide adaptability and sturdy construction. Gisholt continues to set the pace with the new MASTERLINE series—outstanding in ability to handle rugged jobs, with ample power and massive weight to withstand deep cuts at punishing feeds without vibration. Let us tell you more about these machines—and how they can be applied profitably to your manufacturing processes.

Gisholt Machine Company, Madison 10, Wisconsin
Look ahead—keep ahead—with Gisholt





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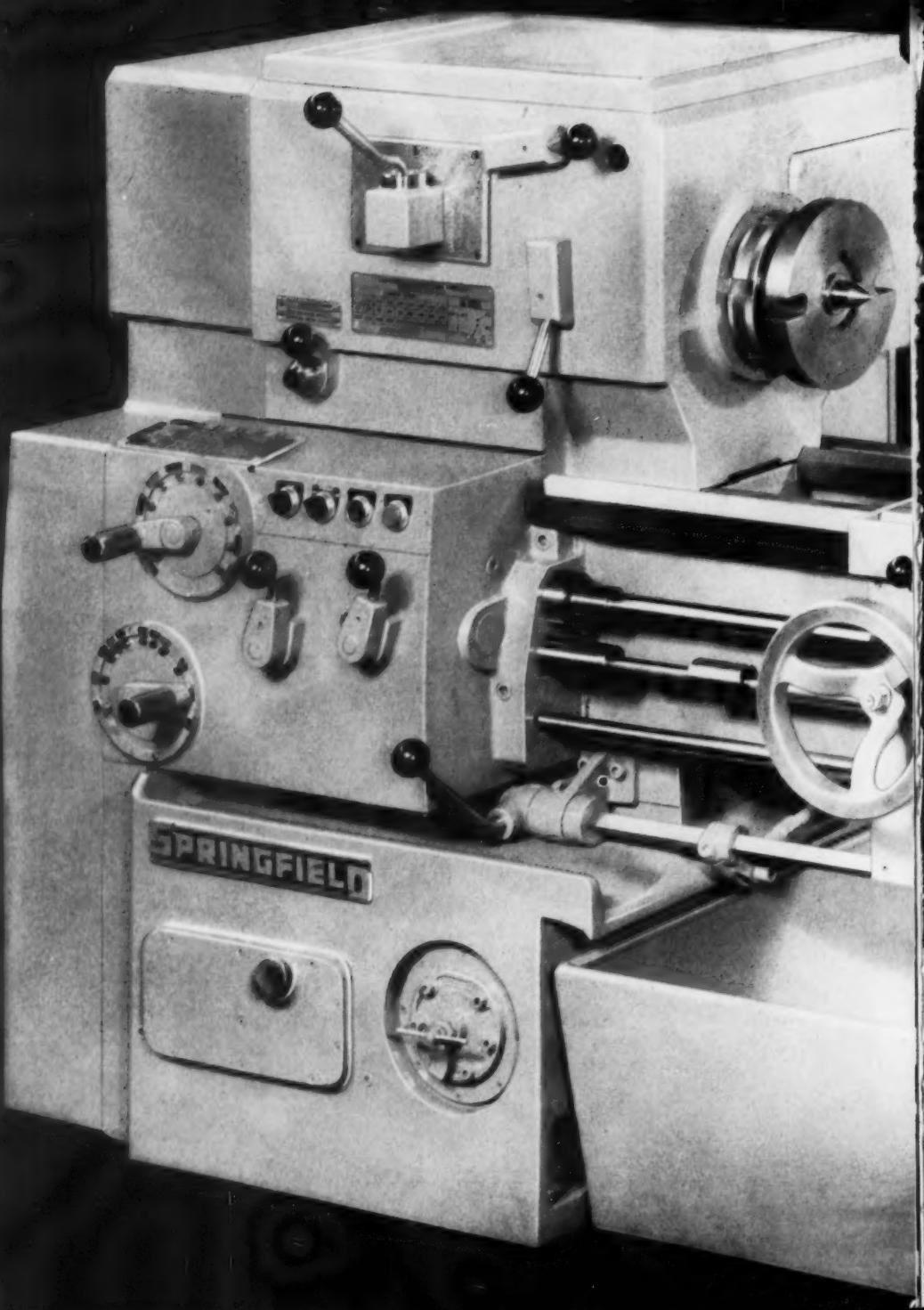
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For precision work where the craftsman's delicate touch is a matter of pride and profit.

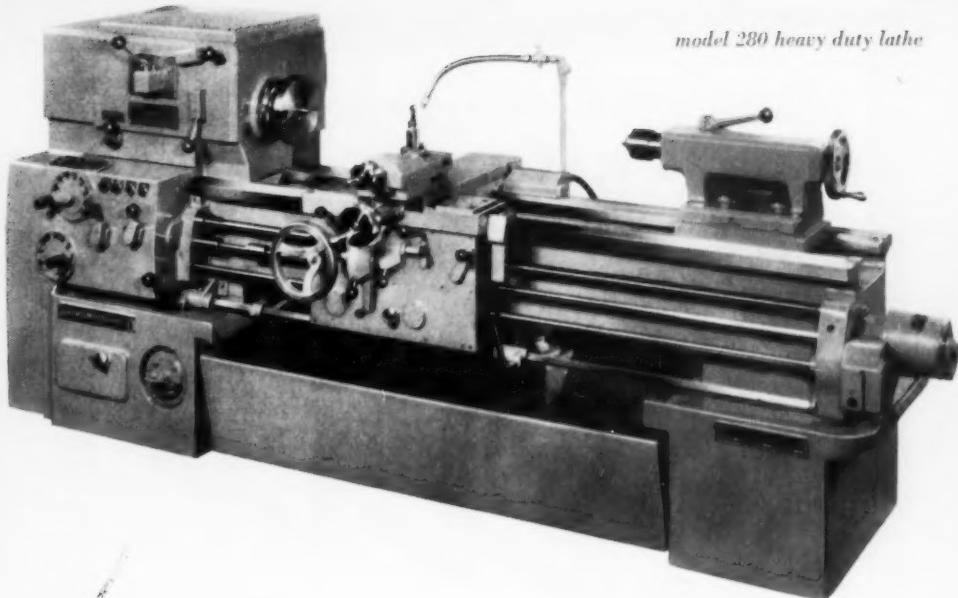
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For fast, smooth work on wood, bobbins, zinc, aluminum, bronze, plastics, cast iron and steels — everywhere.





model 280 heavy duty lathe



it does more work for less money

Springfield is proud to present a new heavy-duty 16" engine lathe, the Model 280. It offers high horsepower—10, 15 or 20 hp—for heavy cuts, clean design, and ease of operation, all at a reasonable price. Direct simplicity and straightforward design assure low maintenance cost.

It has no electronic brain, because Springfield believes that most of today's jobs still require craftsmanship of the human variety. In the Model 280 the price is for the tool, not the brain.

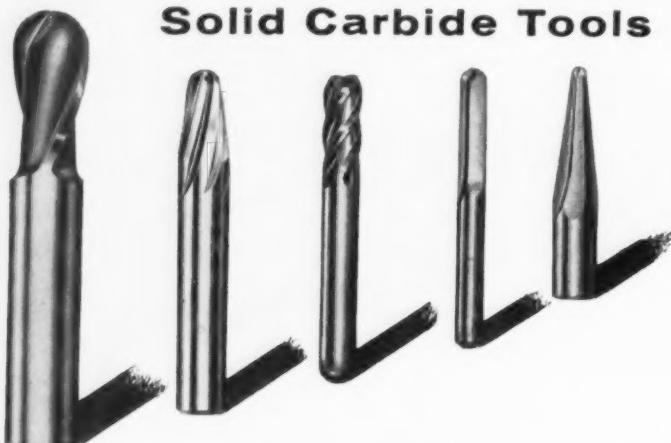
Only the gears necessary for a given speed are in mesh. Sixteen speeds to choose from, 60 feeds and threads—available instantly to any operator. Unique sealed oil spray lubricates and cools gears. It's the lathe most easily converted to contouring and reproducing with accessories, without budget strain. If you're in the quality market for a new heavy-duty lathe that still respects the contribution of craftsmanship, the Model 280 is for you. Basic price FOB Springfield, Ohio, \$8,013.

*The Springfield Machine Tool Company
Springfield, Ohio*

68TH YEAR OF BUILDING IDEAS INTO MACHINE TOOLS

SPRINGFIELD

PRATT & WHITNEY
for the **RIGHT**
Solid Carbide Tools



Yes, carbide *IS* the tool of today and tomorrow! But it's *not* just a case of throwing out high speed tools and replacing with carbide. Extra power is needed. Many factors have to be correlated to determine the correct grade of carbide and the correct operating data for each job.

Now — thanks to P&W cutting tool know-how and experience, supplemented by a 10-year program of special carbide research — you can be SURE of the right carbide tool for every job. Send us your work blueprints; tell us the types of machines involved; we'll be glad to submit our recommendations.

PRATT & WHITNEY COMPANY
INCORPORATED

25 Charter Oak Blvd., West Hartford 1, Connecticut
Direct Factory Representatives in Principal Cities

MACHINE TOOLS • GAGES • CUTTING TOOLS

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Only APEX has all the tools for every fastener need..!

You can drive
not just one
but five types
and all sizes
of screws



Phillips



Socket Head



Slotted



Frearson
(Reed & Prince)



Clutch Head



not just ONE but
a full line of
screwdriving tools

Select the type, size and make of screws best fitted to your fastening requirements . . . choose the method of operation that meets your particular needs . . . then ask Apex for the screwdriving tools to help get the job done faster, better, more economically.

Write, on your company letterhead please, for Catalog 21 (Standard Screwdriving Tools); Catalog 25 (Magnetic Screwdriving and Nut Running Tools) Catalog 29-R (Standard Nut Running Tools).

BIT HOLDERS and INSERT BITS

Originated and pioneered by Apex. Holders have exclusive, patented retaining lock ring to prevent bit from pulling out during driving operation.

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for the answer to your fastening problem!

THE APEX MACHINE & TOOL COMPANY
1027 S. Patterson Blvd. • Dayton 2, Ohio

For more data circle 220 on Reader Service Card

Made with MAGNESIUM for better tooling



LIGHTNESS COUNTS in Checker Cab body assembly. Spot-welding of magnesium plate and extrusions makes it easier at the Checker Cab Plant in Kalamazoo, Michigan.

LIGHTER TOOLS MEAN MORE EFFICIENCY

Lightweight magnesium tooling plate gives jigs and fixtures easier portability . . . reduces worker fatigue

More than ever before, tool engineers are specifying magnesium tooling plate. Ask their reasons and the answers go something like this:

First, of course, there's light weight. Magnesium is one-fourth the weight of steel, one-third lighter than aluminum. The natural result: Work gets done faster, better and with less fatigue. Strained muscles and lost-time accidents show a marked decrease, too. Other reasons always mentioned are magnesium's excellent machinability, weldability,

strength and dimensional stability. Prices are low and availability is no problem.

These are the reasons for magnesium's increasing popularity in the tooling field. Take your tooling problems to your nearest supplier of Dow magnesium or write THE DOW CHEMICAL COMPANY, Midland, Mich., Dept. MA 370M.

AVAILABLE FROM STOCK AT: COPPER AND BRASS SALES, INC., Detroit, Mich. • FULLERTON STEEL AND WIRE COMPANY, Chicago, Ill. • HUBBELL METALS, INC., St. Louis, Mo. • A. R. PURDY CO., INC., Lyndhurst, N.J. • RELIANCE STEEL COMPANY, Los Angeles, Calif. • WINSON STEEL & ALUMINUM COMPANY, Dallas, Texas.

you can depend on DOW MAGNESIUM



For more data circle 222 on Reader Service Card



THIS is No Ordinary Power Hack Saw Blade

This is the *unbreakable* MARVEL High-Speed-Edge Hack Saw Blade—the first bi-metal blade—invented, developed and introduced by MARVEL. This blade is a combination of two materials best suited to the requirements of an efficient hack saw blade . . . a narrow high speed steel cutting edge permanently welded to a tough, non-brittle alloy steel body. Each blade is triple tempered to assure long life and maximum toughness to the cutting edge.

With a MARVEL Blade, you can cut any material—from the free machining steels to the toughest alloys . . . fast, accurately and economically.

You can tension a MARVEL Blade from 200% to 300% tauter than any ordinary blade, permitting much higher speeds and heavier feeds without deflection or breakage.

Like all good things, attempted copies of the MARVEL Blade have been numerous, but its performance has been *unequalled* by any of the imitators. Ask for MARVEL Blades by name and you can be sure you're getting the best on the market. Leading Industrial Distributors have them in stock.

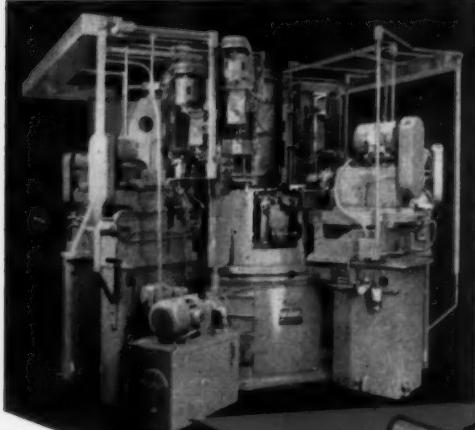
Write for latest cutting tool Bulletin and the name of your nearest MARVEL Distributor.



F8-1020

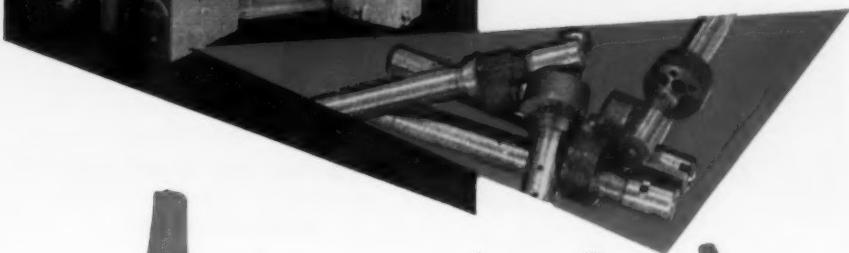
ARMSTRONG-BLUM MFG. CO. 5700 W. Bloomingdale Ave., CHICAGO 39, U.S.A.

For more data circle 223 on Reader Service Card



EVERY 8 HOURS THIS
PRECISION MACHINE

- DRILLS 8536 HOLES
- MILLS 776 FLATS
- MILLS 776 SLOTS



Automatically!

This MORRIS Model 322-S High Production Machine produces 97 refrigeration compressor crankshafts per hour at 80% efficiency. In each part it automatically drills 11 holes, varying in diameter from .125" to .375". Six holes, including one hole $4\frac{1}{4}$ " deep, are drilled using gun drilling techniques. In addition, the machine mills one end slot and one chordal flat on the shaft.

These operations are coordinated through use of a MORRIS basic center column machine, equipped with

a 48" dia. table, a 12-station automatic indexing mechanism, and 16 MORRIS AIR-OIL-Matic and Cam-Matic Drill Units.

The result is a completely automatic "special" machine, designed using a standard basic machine and standard drill units . . . at a fraction of the usual special machine cost.

WRITE TODAY for detailed literature, or outline your production problem for analysis by MORRIS engineers.

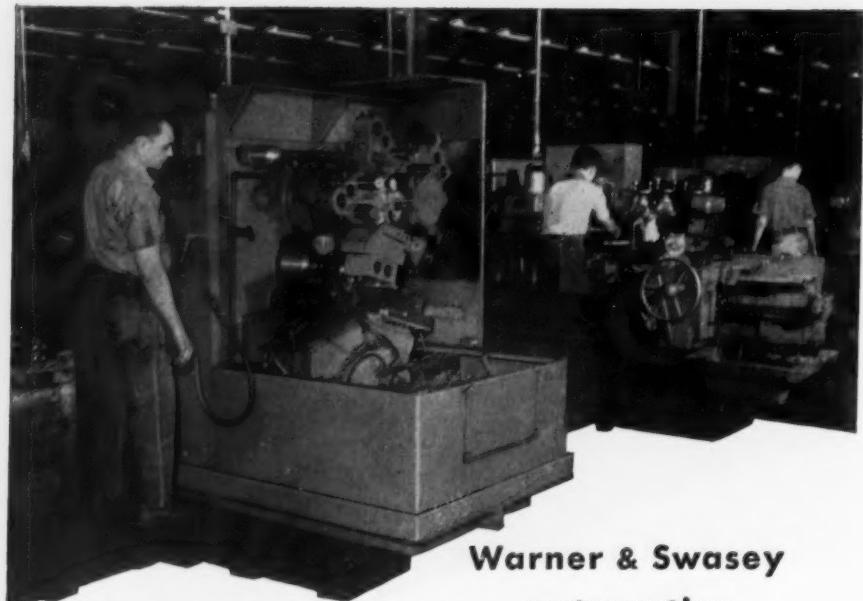
See our insert in
Sweet's Machine Tool File



Morris

MACHINE TOOL COMPANY
934 HARRIET STREET
CINCINNATI 3, OHIO

For more data circle 224 on Reader Service Card



Warner & Swasey automatics

slash machining time on 50 to 350 piece lots

THE YALE & TOWNE MANUFACTURING COMPANY, Philadelphia, machine 64,000 different parts, on a two-month cycle, for their five models of industrial lift trucks. They installed two Warner & Swasey 2 AC Single Spindle Automatics to step up production on a wide variety of small lot parts. Lot sizes range from 50 to 350 pieces.

They quickly realized the expected production increase, plus more efficient use of manpower, since one operator can easily handle both automatics.

They selected Warner & Swasey 2 AC's for the job because these machines give them the advantage of automatic production *without* the usual penalties of greatly increased setup time. Their setup time is just a small fraction more than on turret lathes.

"Another big advantage we had not fully anticipated," they report, "is the interchangeability of tools. The very accessible tooling area and the use of many standard turret lathe tools are valuable features of these automatics."

There are undoubtedly many small lot, "turret lathe" jobs in your own plant that could be machined faster, more profitably and with extreme accuracy on Warner & Swasey Single Spindle Automatics. Have your Warner & Swasey Field Representative show you how these machines' flexibility and fast setup can pay off for you.



YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS...WITH A WARNER & SWASEY

For more data circle 225 on Reader Service Card



Can your tapper pass this

Performance Test?

(CHECK IF "YES" ONLY)

- | | |
|---|---|
| <input type="checkbox"/> Maintains production
for long periods | <input type="checkbox"/> Less operator
fatigue |
| <input type="checkbox"/> Fewer
Broken taps | <input type="checkbox"/> Less "down time"
interruption |
| <input type="checkbox"/> Fewer spoiled
pieces | <input type="checkbox"/> Maintains accuracy
at high speeds |

If You Cannot Answer Yes to
Each of the Above... Your Tapper
is Not Operating Efficiently

Unquestionably, there is a difference in tapping heads and in Procunier you'll find that unmistakable difference. If your tapper is not producing up to par—regardless of your demands and schedules—it will pay you to check into the possibility of using Procunier. Designed by practical engineers, they have been consistently producing "profitably" under "back breaking" production schedules.

Procunier superiority can be attributed to many unique construction characteristics—a practical double cone cork faced friction clutch, wobble free spindle, quick start, stop and reverse mechanism, finger tip control, exclusive tap holder, plus a host of others.

Procunier heads are unduplicated for accuracy, dependability and all 'round efficiency. They are proven performers. Get the full story today. Write for free brochure.



Free Brochure

giving the full, interesting
Procunier Story with parts
chart and graph on
the complete Procunier line.



PROCUNIER
Safety Chuck Co.
12 S. Clinton St.,
Dept. 4
Chicago 6, Illinois

PROCUNIER SAFETY CHUCK CO.,
12 S. Clinton St., Chicago 6, Ill. Dept. 4.

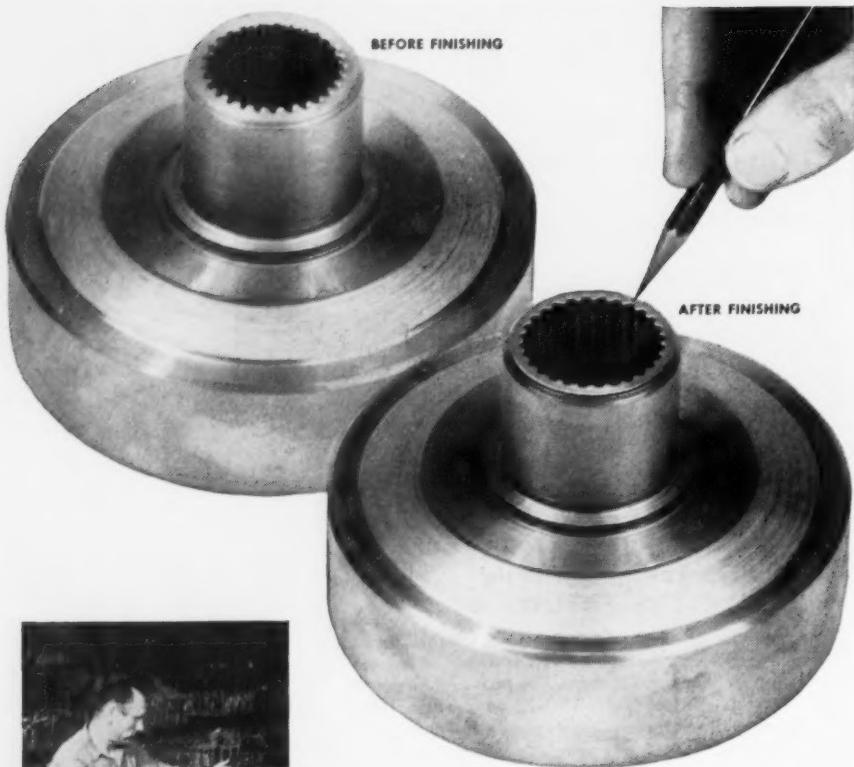
Gentlemen: Please send your Free Illustrated
Brochure.

Name.....

Address.....

City..... Zone..... State.....

For more data circle 226 on Reader Service Card



Osborn Brushamatic® 5A removes burrs, blends and finishes surface junctures on end of spline in continuous run of 2000-2400 of these gears per day.

5-second finish for gears

IN a major automotive plant, 5-second Brushamatic* finishing of this gear helps maintain a high daily production rate of 2000 top-quality automatic transmissions.

An Osborn Brushing Analysis of your finishing operations will show how you can profit from Brushamatic finishing methods proved in automotive and other industries. Write *The Osborn Manufacturing Company, Dept. B-4, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

*Trade-Mark

Osborn Brushes

OSBORN

BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES
BRUSHING MACHINES • FOUNDRY MOLDING MACHINES

For more data circle 227 on Reader Service Card

PRECISION PETE SAYS:



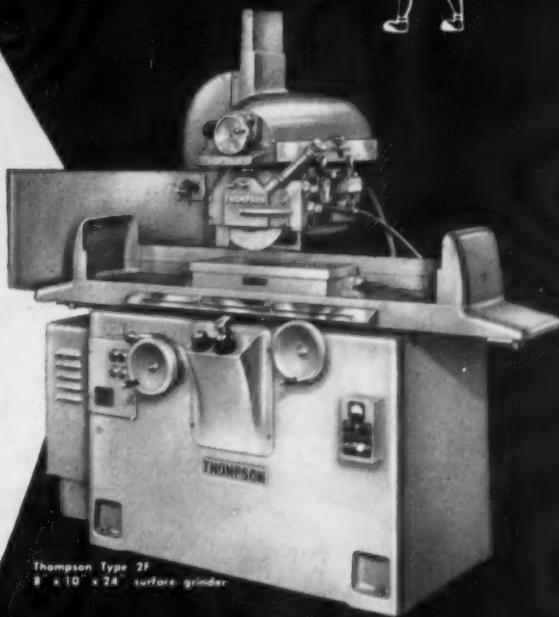
**COOLANT
THRU THE
WHEEL . . .**

2

**... COOLANT
EXTERNALLY ON
THE WORK . . .**

**. . . AND
"IN POSITION"
WHEEL
TRUING**

3



MANUFACTURERS
OF THE WORLD'S
MOST COMPLETE LINE
OF SURFACE GRINDERS

WRITE TODAY FOR DESCRIPTIVE DATA

THE THOMPSON GRINDER COMPANY
SPRINGFIELD, MASS.

Thompson
SURFACE
Grinders

Copyright 1956 The Thompson Grinder Company

CBS-HYTRON

VICKERS.

America's
Industrial leaders
select
**Cincinnati
Sub-Zero
Chilling
Equipment**

for
shrinking, testing
or treatment
of metals
and many other
uses



DIVISION OF BENDIX AVIATION CORP.

SKF
INDUSTRIES, INC.

BENDIX
ERIEZ

Bendix THE BANK

Aetna
BALL AND ROLLER BEARINGS

CV
O O X N V P

BELL Aircraft CORPORATION

Whether you require high production chilling units, laboratory units, high and low temperature test chambers, altitude chambers, or special units, we can satisfy your needs.

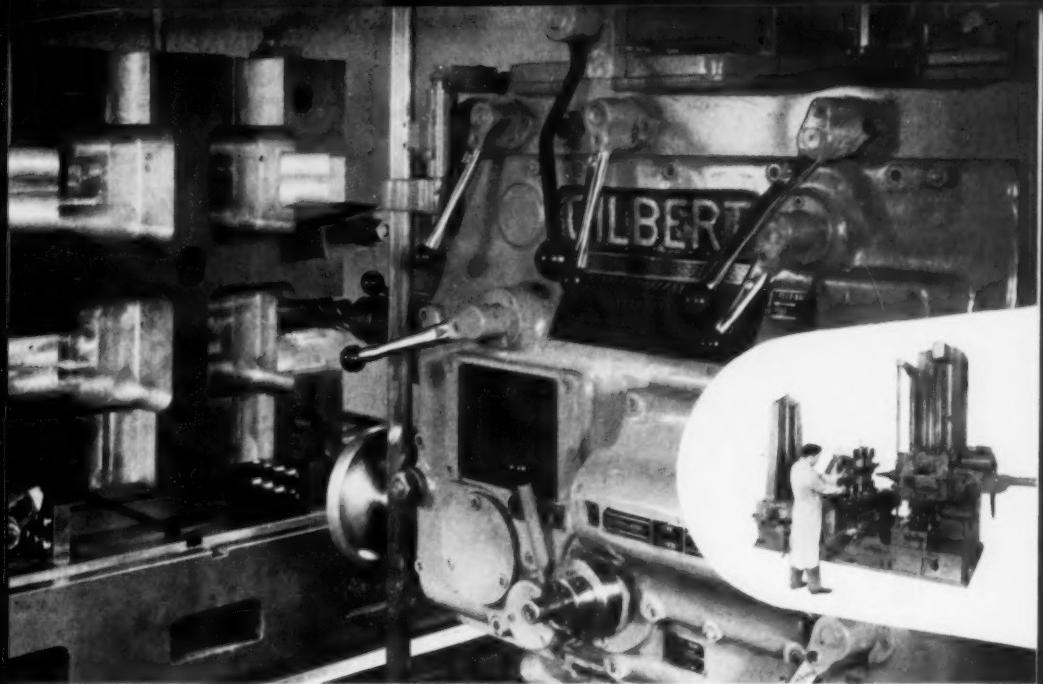
Follow the leaders. Write today for complete line catalog.

Cincinnati Sub-Zero Products

General Offices and Plant

3930-56 Reading Road, Cincinnati 29, Ohio

For more data circle 229 on Reader Service Card



courtesy Mohawk Tool & Die Corporation and Macaulay Machinery Co.

30 percent savings and $\pm .001"$... match it with a Gilbert

How's this for a perfect lineup: 30% savings in floor-to-floor time over previous machines, and $\pm .001"$ for mating the two chases of a four-cavity carburetor bowl mold.

Mohawk Tool & Die Corp., Rochester, N.Y., gets these savings and accuracy by handling the job on a Cincinnati Gilbert horizontal boring mill.

Here the lower chase (of hot work die steel) is being rough machined. Then it's hardened to a Rockwell of 48-50C scale. Finally, the chase is finish machined with carbide to an accuracy of $\pm .001"$ for guide pin and bushing holes, four

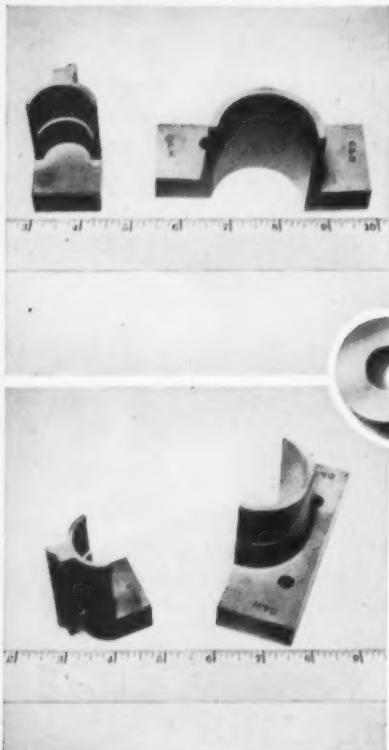
cavity pockets, and eight slide ways.

Says Mr. George Neward, Mohawk's Secretary-Treasurer: "This job illustrates the flexibility of this type of machine. The ruggedness and stability of the Cincinnati Gilbert has been proven to us without doubt."

The comparatively low cost of adding these advantages to your operations will surprise you. Write for new literature, or—better yet—get a proposal from Gilbert now.

*The Cincinnati Gilbert Machine Tool Co.,
3366 Beekman Street, Cincinnati 23, Ohio*

those who buy Gilbert buy GILBERT again



**Look How You Can
Save with
PREFORMED**

CARMET

DIE SECTIONS

**these Blanks are preformed
to a Finishing Allowance
of .018"-.022" per side**



**Write for Your Copy:
CARMET CATALOG**

Just out . . . 32 well-illustrated pages, containing data on all Carmet grades, and on Carmet blanks, tools, die sections, punches, draw die inserts, etc.; also special preforming to order.
● Write for your copy.

ADDRESS DEPT. MS-76

These tungsten carbide die sections are of Carmet CA-11, a special grade developed expressly for punches, dies, and other heavy shock applications where wear and abrasion resistance are required.

These blanks have a span of 1.315" with a wall thickness of only .046", but they were easily produced to close tolerances by AL's precision preform methods. All surfaces are clean, smooth and free from defects, requiring only a minimum amount of grinding to final dimensions.

Carmet carbides can be accurately produced to practically any shape or size your designs may require, and can be supplied preformed as desired. Typical highly successful applications include inserts for drawing, heading, extruding and blanking dies; gauge and wear parts; pins; bushings; etc.

Find out, TODAY, how you can cut costs with preformed Carmet. Write or call *Allegheny Ludlum Steel Corporation, Carmet Division, Wanda and Jarvis Avenues, Detroit 20, Mich.*

For ALL your CARBIDE needs, call
Allegheny Ludlum

W.A.O. 8180



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↓ Use this Reader Service Card for requesting more information on products described and advertised ↓

READER SERVICE CARD

April 1956 Issue

Your Name _____

GOOD UNTIL JUNE 1, 1956

Company Name _____

**modern
machine
shop**

Company Address _____

Zone _____

State _____

City _____

Products Manufactured

Circle KEY numbers (NOT PAGE NUMBERS) for more information on items described or advertised in this issue.

Editorial Items ADVERTISEMENTS

431 Main Street
Cincinnati 2, Ohio

	1	21	41	61	81	101	121	141	First Cover	Second Cover	Third Cover	Fourth Cover
2	22	42	62	82	102	122	142	201	220	239	258	277
3	23	43	63	83	103	123	143	202	221	240	259	278
4	24	44	64	84	104	124	144	203	222	241	260	279
5	25	45	65	85	105	125	145	204	223	242	261	280
6	26	46	66	86	106	126	146	205	224	243	262	281
7	27	47	67	87	107	127	147	206	225	244	263	282
8	28	48	68	88	108	128	148	207	226	245	264	283
9	29	49	69	89	109	129	149	208	227	246	265	284
10	30	50	70	90	110	130	150	209	228	247	266	285
11	31	51	71	91	111	131	151	210	229	248	267	286
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15	35	55	75	95	115	135	155	214	233	252	271	290
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18	38	58	78	98	118	138	158	217	236	255	274	293
19	39	59	79	99	119	139	159	218	237	256	275	294
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NEW YORK, N. Y.

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No Postage Stamp Necessary If Mailed in the United States

4c POSTAGE WILL BE PAID BY—

modern

machine

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BOX 74

VILLAGE STATION

NEW YORK 14, NEW YORK



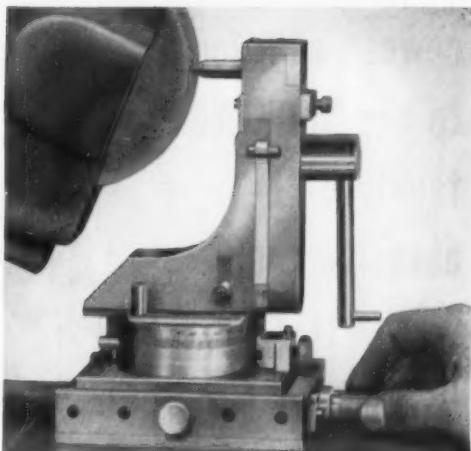
Tough Grinding Wheel Forms Dressed Easy as A, B, C

eliminate elaborate set-ups
and operations

.0001" ACCURACY

Fluidmotion
WHEEL DRESSERS

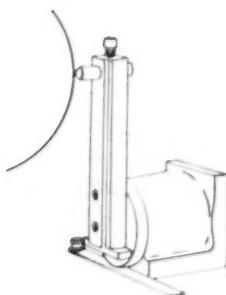
dress two angles tangent to a radius
in one continuous motion



With the unique "Fluidmotion" Dresser, you can dress two angles tangent to a radius — using one handle in one continuous motion. Operation is so fast and simple that beginners can use them.

Adaptable to all type cylindrical and surface grinders.

- A. Obtain micrometer reading; add required convex radius or subtract required concave radius.
- B. Loosen jib with wrench and "mike" over lower pins to reading obtained above.
- C. Tighten jib. Set stops for two angles. Ready for action.



Also available: "FORM MASTER" Dresser, capable of dressing any radii up to 12" convex, up to 15" concave. Prices start at

\$45.00

**WRITE FOR INFORMATION ON THE NEW
J & S PURCHASE PLAN**

See your industrial distributor or write for free literature.

WHEEL DRESSERS J & S
TOOL CO., INC. JAW CLAMPS • PRECISION VISES • DOWN HOLDING DEVICES

J & S TOOL CO., INC.

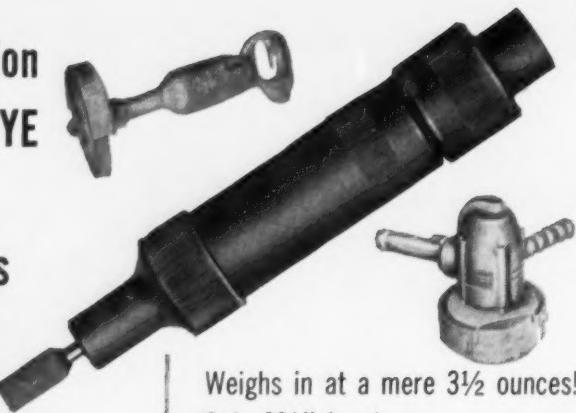
CLAMP CUT

871 DORSA AVE.
LIVINGSTON, NEW JERSEY

For more data circle 232 on Reader Service Card

**newest addition
to the BUCKEYE
family of
abrasive tools**

**little JEFF
the
MINI-GRINDER**



Weighs in at a mere $3\frac{1}{2}$ ounces!
Only $3\frac{3}{4}$ " long!
Powerful vane-type motor.
Capacity: $\frac{1}{2}$ " mounted points.
($\frac{1}{8}$ " collet)
All ball-bearing construction,
easy to service.

**FOR FINELY DETAILED, PRECISION GRINDING
IN TOOL ROOM OR ON PRODUCTION**

At 50,000 RPM, this tiny Buckeye Mini-Grinder stirs up a storm of power that gets an amazing amount of work done in a hurry. No bigger—or heavier—than a pen-type flashlight, the Mini-Grinder can be used for precision grinding in the smallest work areas. Sturdy, all-steel construction. Complete kit, packaged in sturdy tool box, includes mounted points, hose and connections, vitalizer (lubricator-filter), wrenches and dressing stone.

Catalog A-10 contains data and specifications on all Buckeye abrasive tools—write for your copy today!

Buckeye Tools
CORPORATION
DIVISION 17 • DAYTON 1, OHIO

producers of
the world's first
successful
rotary air tools

For more data circle 233 on Reader Service Card

DIFFICULT JOBS ARE routine on

DeVlieg SPIRAMATIC

JIGMILS®

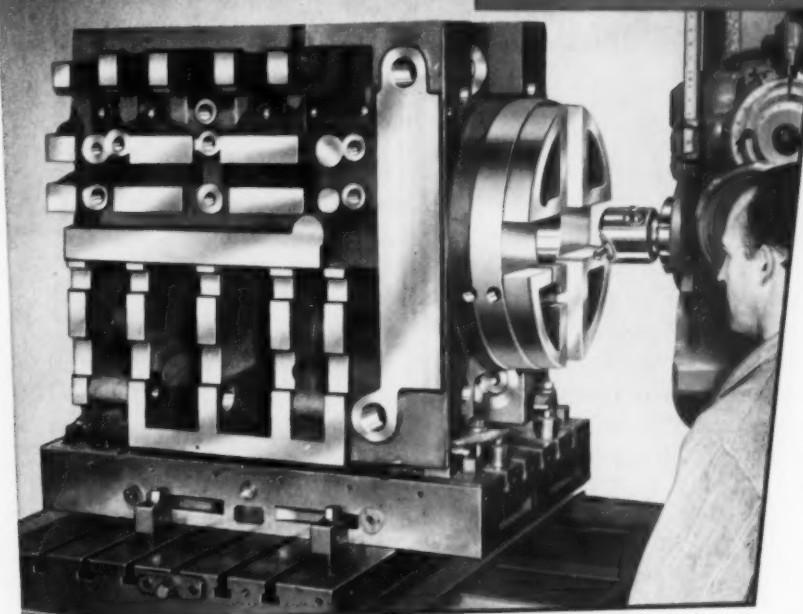


PHOTO COURTESY OF DANBOT BORING CO.

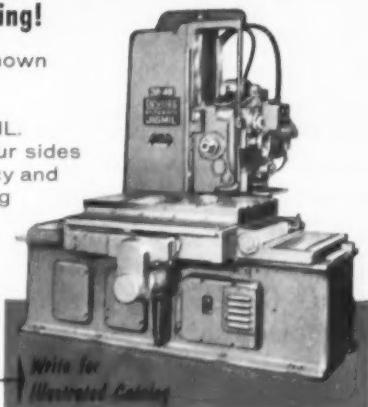
DeVlieg SPIRAMATIC JIGMILS permit accurate machining of workpiece from 4 sides at 1 setting!

The above photograph, taken in a well known Detroit Tool Shop, illustrates a Special Hydraulic Fixture being machined on a DeVlieg Model 3B-48 SPIRAMATIC JIGMIL. This job was completely machined on four sides at one setting to precise limits of accuracy and operations included drilling, boring, milling and O.D. turning 22" diameter trunnion.

Come to Detroit...
See a practical demonstration of the JIGMIL Technique

DE VLIEG MACHINE COMPANY

450 Fair Avenue, Ferndale • Detroit 20, Michigan



For more data circle 234 on Reader Service Card

High Speed Production

Grinding

DEMANDS ...

High speed production grinding has made just coolants obsolete! Today's water-mix grinding fluid must provide lubrication, heat dissipation qualities, anti-rust protection and balanced surface tension. If you're using "just a coolant", it's costing you extra money!

Stuart's CODOL is a carefully designed liquid grinding compound that is *far more than just a coolant*. CODOL has been scientifically compounded to provide far more detergency than ordinary water-mix grinding fluids. Wheel loading is greatly reduced and allows more pieces to be ground per wheel dressing.

CODOL's carefully balanced surface tension insures the carrying away of chips and abrasive par-

ticles from the wheel, work and machine. Surface finish is improved, production is increased and good wheel life is obtained.

To be sure that you consider *all* of the important points, such as ease of mixing, resistance to rancidity, gumming and foaming, when selecting a water-mix grinding fluid, ask "the Man in the Barrel", your Stuart Representative, to call and help you. And write today for your copy of the Stuart Water-Mix Cutting and Grinding Fluid book.

D. A. STUART OIL COMPANY, LTD.
2741-47 S. Troy St., Chicago 23, Ill.



More than a "Coolant" is Needed

Plants in: Chicago, Detroit, Cleveland, Hartford, and Toronto, Ontario.

Branch Warehouses and Representatives in principal metal working centers in the United States, Canada and Europe.

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....more than just a coolant.....



Stuart Oils

Time Tested Cutting Fluids and Lubricants

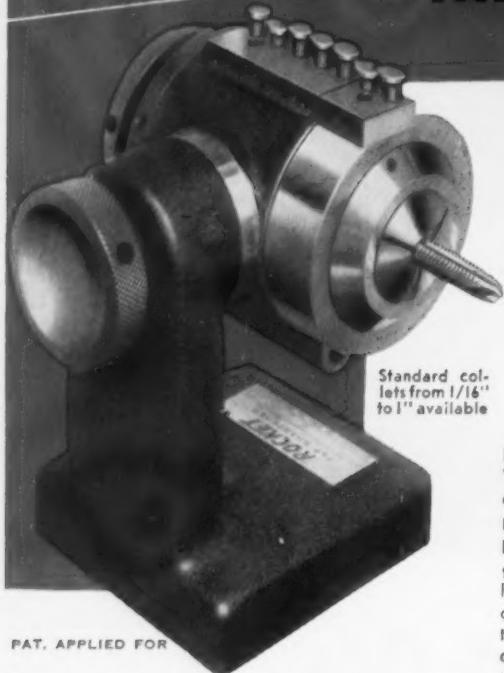
April, 1956

modern machine shop 37

sharpen dull taps swiftly, economically, and accurately

THE *Rocket*

TAP SHARPENER



Standard collets from 1/16" to 1" available

PAT. APPLIED FOR

There's a ROCKET sales representative in your area. We will be glad to direct him to you for a demonstration of this unit. Literature is available upon request.



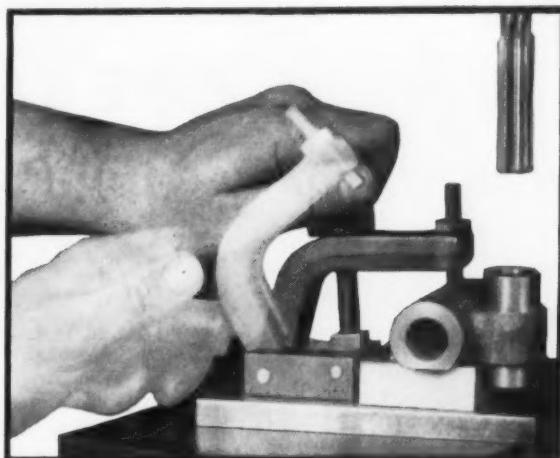
ROCKFORD DIE & TOOL WORKS, INC.

1816 Seventeenth Ave. • Rockford, Illinois

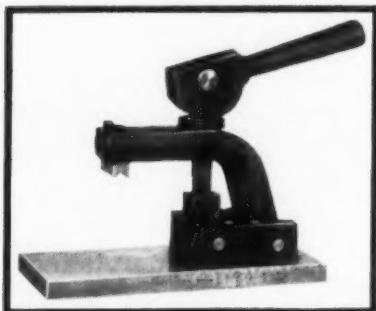
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Fast and Sure Clamping LODDING Retracting Clamps

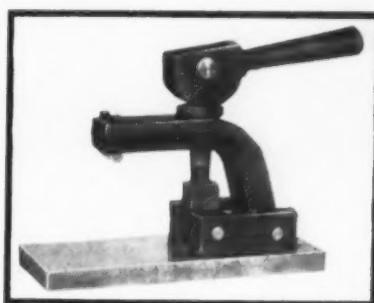
Air automation,
too—as fast as
your air line—
absolutely rigid—
self retracting



As quick as your hand, a quarter turn of the screw—one movement of your arm—and your Lodding Clamp is at work. Another simple movement releases work and retracts Clamp. Here is complete surety and quick action—a time and cost saver. Four sizes each of four styles. Hand knob, cam or nut.



Block Adaptor



Round Adaptor

Mounting holes for easy adaptor installation

Factory Warehouse
Precision Tool Sales, 417 E. Florence Ave., Los Angeles 3—PL 3-3321

LODDING, Inc., Worcester 1, Mass.

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Now... AVAILABLE FROM STOCK *Jarvis PIPE TAPS*

WITH STANDARD HAND TAP SHANKS!



Here's the answer to the problems presented by conventional pipe taps! Exclusive Jarvis Pipe Taps with standard hand tap shanks easily fit any tapping machine or device—with never a chucking bottleneck. This addition to the dependable Jarvis line of standard taps affords new tapping versatility and precision.

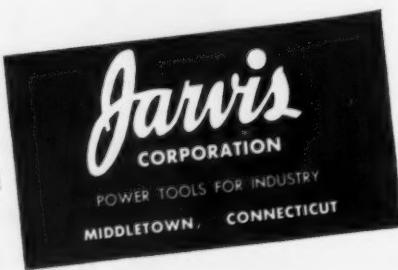
Here's the big advantage of Jarvis taps with Standard Hand Tap Shanks—

	$\frac{1}{4}''$ —18 NPT Standard Pipe Tap	$\frac{1}{4}''$ —18 NPT New Jarvis Pipe Tap
Shank dia.	.5625	.480
Square size	.421	.360
Overall lgth.	$2\frac{7}{16}''$	$3\frac{1}{16}''$

Three other sizes are stocked— $\frac{1}{8}''$, $\frac{3}{16}''$, $\frac{1}{2}''$ —and all save man-hours, production dollars. A Jarvis representative is as near as your phone.

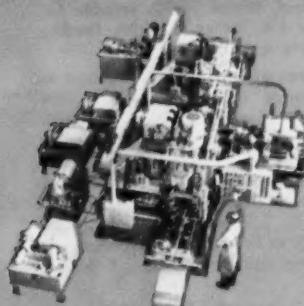
*Send Today
for Catalog!*

Complete manual with tap data and tips for better tapping is yours for the asking!



For more data circle 239 on Reader Service Card

Here's Automatic Production On High-precision Parts



Multiple-spindle drilling, boring,
facing and tapping machines
Special machines for automatic production

When is fast transfer production limited by precision requirements? This frontier is steadily being pushed back by Natco engineers in new Holeway processing machines.

Take this throttle body, for example. The large holes are reamed to limits of .0015" for location, .0003" for size, 125 microinch finish! Production — 600 parts per hour!

Natco's high-speed gun-drilling heads give required finish in interrupted throttle-shaft holes without reaming. Size is held to within .001".

Many unusual problems are solved in locating, holding and positively controlling light-weight parts between stations at high transfer speed. Chip disposal is automatic; cutting oil is filtered for re-use.

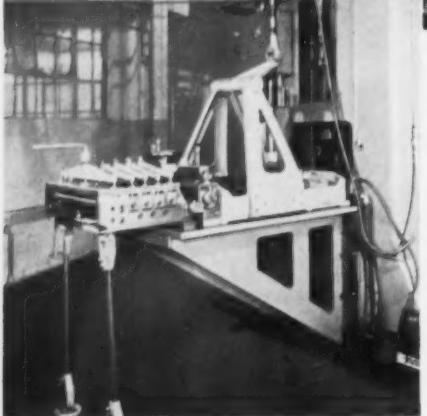
Here's the sequence of operations. Combination rough and semi-finish ream four large holes. Gun drill two holes (two breakthroughs each). Finish ream four large holes.

Whenever fast, automatic production makes sense, don't let high-precision requirements stop you. A Natco engineer can tell you in a hurry whether it's feasible and how the job can be done.

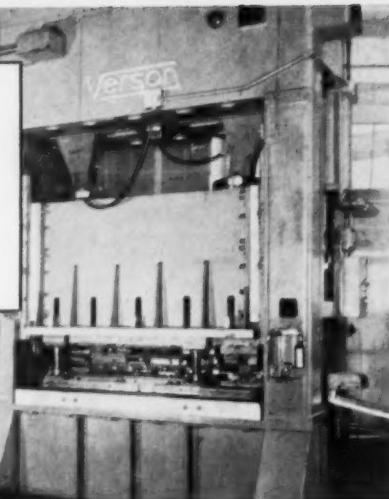
NATCO

National Automatic Tool Company, Inc. Richmond, Indiana

For Small Stampings . . . For Large Stampings Equip your Presses with U.S. SLIDE FEEDS



Both illustrations directly above show the SF-24-24 U. S. Slide Feed, suitable for material up to 24 inches in width, feeding length adjustable up to 24 inches, with Plain Straightener mounted on a Verson Straight Side Press. To the left is shown the smallest U. S. Slide Feed, Model SF-00, suitable for material up to 1½ inches in width, feed length up to 1 inch.



For the accurate automatic feeding of coil stock up to 24 inches in width into punch presses, there is a size Slide Feed to suit your particular requirements. The illustrations show the largest size, Model SF-24-24, suitable for material up to 24 inches in width and feeding length adjustable up to 24 inches mounted on a Straight Side Verson Press at Federal Pacific Electric Company in Newark, N. J., and the smallest U. S. Slide Feed, Model SF-00, suitable for material up to 1½ inches in width, feeding length adjustable up to 1 inch.

U. S. Slide Feeds are generally recognized as the most accurate automatic feeds on the market for the feeding of coil stock into punch presses. They are designed so that the length of feed is controlled between positive stops, providing the consistent accuracy so necessary in progressive die operations. U. S. Slide Feeds together with U. S. Stock Straighteners, Coil Cradles, and other Press Room Equipment convert your presses into automatic machines.

If you use presses of any size in your production write for Bulletins 80-S and 90-S illustrating and describing the complete line of U. S. automatic pressroom equipment.

U. S. TOOL COMPANY, Inc.

AMPERE (East Orange)
NEW JERSEY

Builders of U. S. Multi-Slides — U. S. Multi-Millers

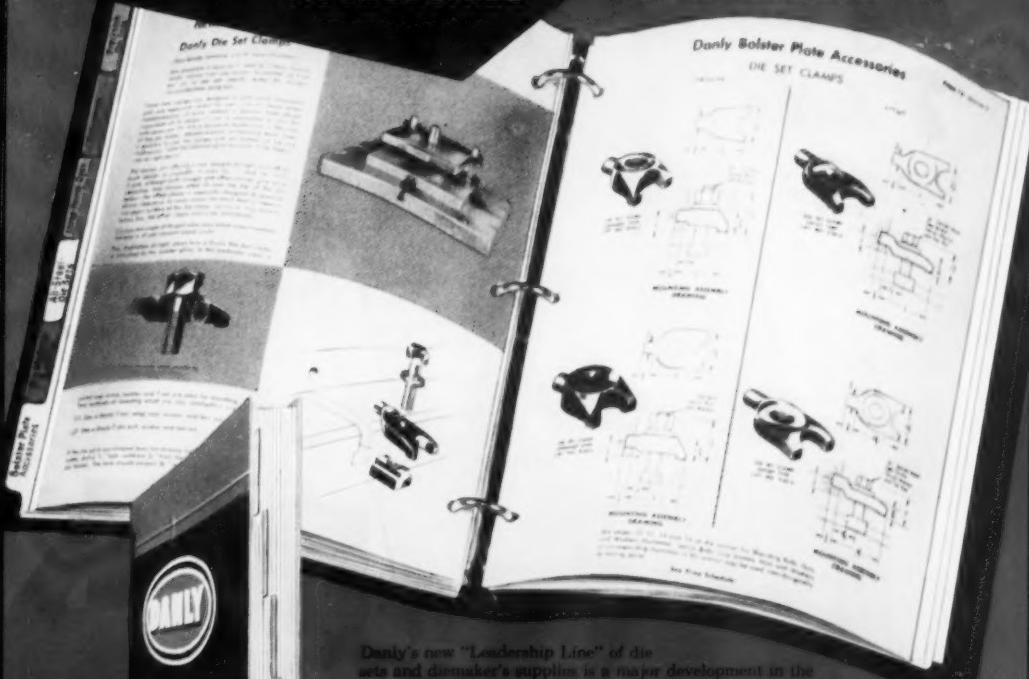
U. S. Automatic Press Room Equipment — U. S. Die Sets and Accessories

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now...

ONE COMPLETE
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T lathe

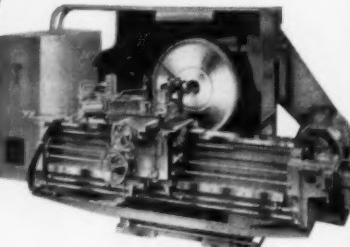


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As the use of Lodge & Shipley T Lathes spreads over an ever-widening variety of applications, the extreme versatility of this lathe becomes more apparent. Wherever large diameter, short length workpieces must be faced, turned or bored, the T Lathe proves notable accuracy and productivity.

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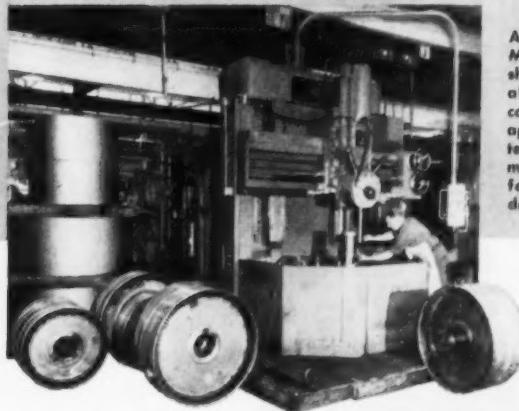
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MODEL 75



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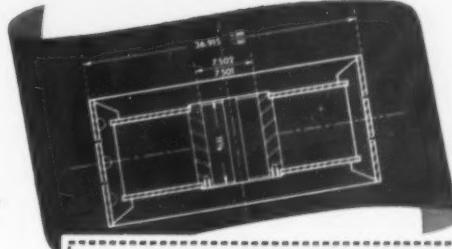
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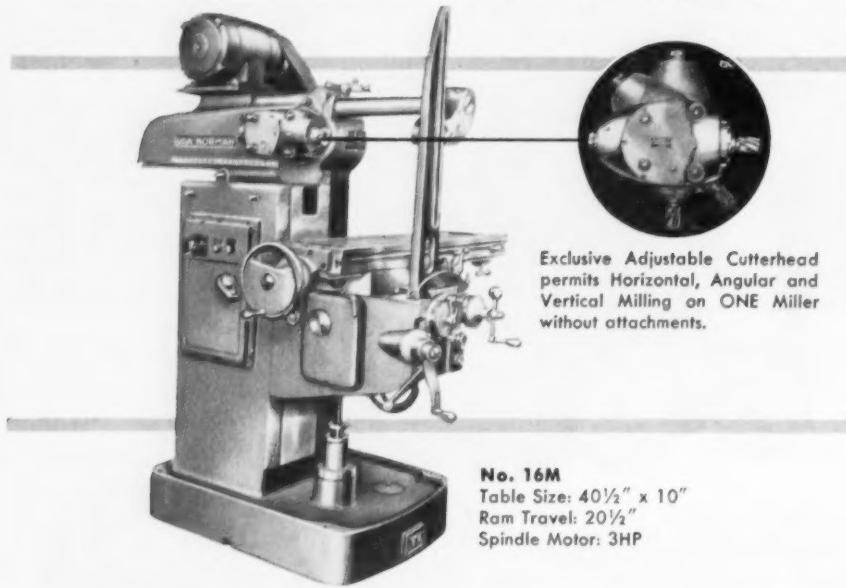
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Saves Equipment Dollars . . . Cuts Production Costs!



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Ram Travel: 20½"
Spindle Motor: 3HP

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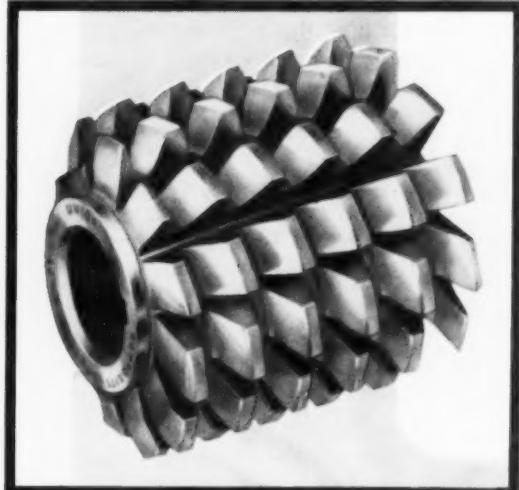
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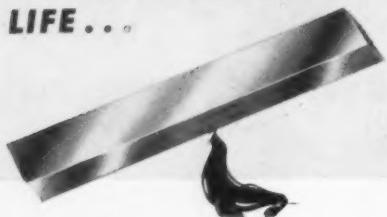
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Meetings

Important Meeting Dates

* * * * *

April 3 • Material Handling Institute, Spring Meeting, Edgewater Beach Hotel, Chicago. Institute headquarters: One Gateway Center, Pittsburgh 22, Pennsylvania.

April 4-6 • American Society of Lubrication Engineers, Annual Meeting and Exhibit, Penn Hotel, Pittsburgh. Society headquarters: 84 E. Randolph Street, Chicago 1, Illinois.

April 4-7 • National Screw Machine Products Association, Annual Meeting, Schroeder Hotel, Milwaukee. Association headquarters: 2860 E. 130th St., Cleveland 20, Ohio.

April 9-11 • American Institute of Mining & Metallurgical Engineers, National Open-Hearth Conference, Netherland Plaza Hotel, Cincinnati. Institute headquarters: 29 W. 39th St., New York 18, New York.

April 10-11 • American Society of Mechanical Engineers, Machine Design Conference, Bancroft Hotel, Worcester, Mass. Society headquarters: 29 W. 39th St., New York 18, New York.

April 10-12 • Metal Powder Association, Annual Meeting and Show, Hotel Cleveland, Cleveland. Association headquarters: 420 Lexington Ave., New York 17, New York.

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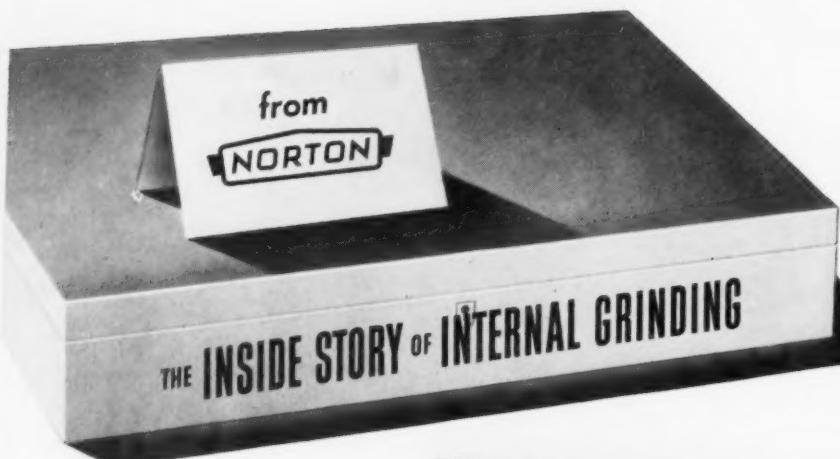
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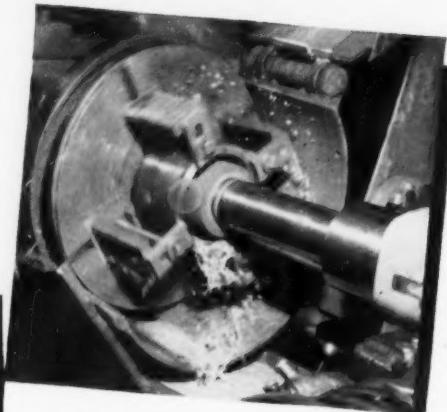
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"TOUCH of GOLD"

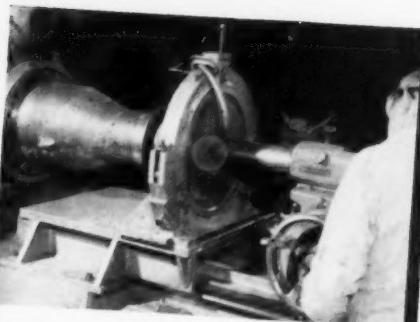
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During hardening, a certain amount of warpage occurs in this steel mould band. A Norton wheel is grinding it perfectly round and smooth. The band has an I.D. of 6" and is 4" deep. Average amount of stock removal is .040" and the time cycle is 30 minutes. Norton wheels for internal grinding are precision-processed for absolutely uniform grinding action and identical top performance.



One Norton Wheel — Two Good Jobs

In grinding this trunnion, one Norton wheel is used on both ends. Material is stainless steel No. 304. The larger hole measures $13\frac{1}{16}''$ I.D. x $4''$ long; the smaller is $5\frac{1}{2}''$ I.D. x $4''$ long. Stock removal from each end is $.015''$, to tolerance limits of $\pm .0002''$. Four complete trunnions — eight grinding jobs — are done each day. Investigate the famous Norton G Bond and 32 ALUNDUM* combination, ideal for many precision and semi-precision applications.

W-1687



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This Norton wheel is grinding a bearing sleeve of 52100 steel, 62 to 63 Rockwell C. The hole is $3\frac{1}{4}''$ I.D. x $42\frac{3}{32}''$ long. From $.005''$ to $.006''$ of stock is removed, within limits of $+.0008'', -.0000''$. The surface is finished to 4 microinches RMS and grinding time is 30 minutes each. Cool running, fast cutting, long lasting Norton wheels are made for every internal grinding requirement.



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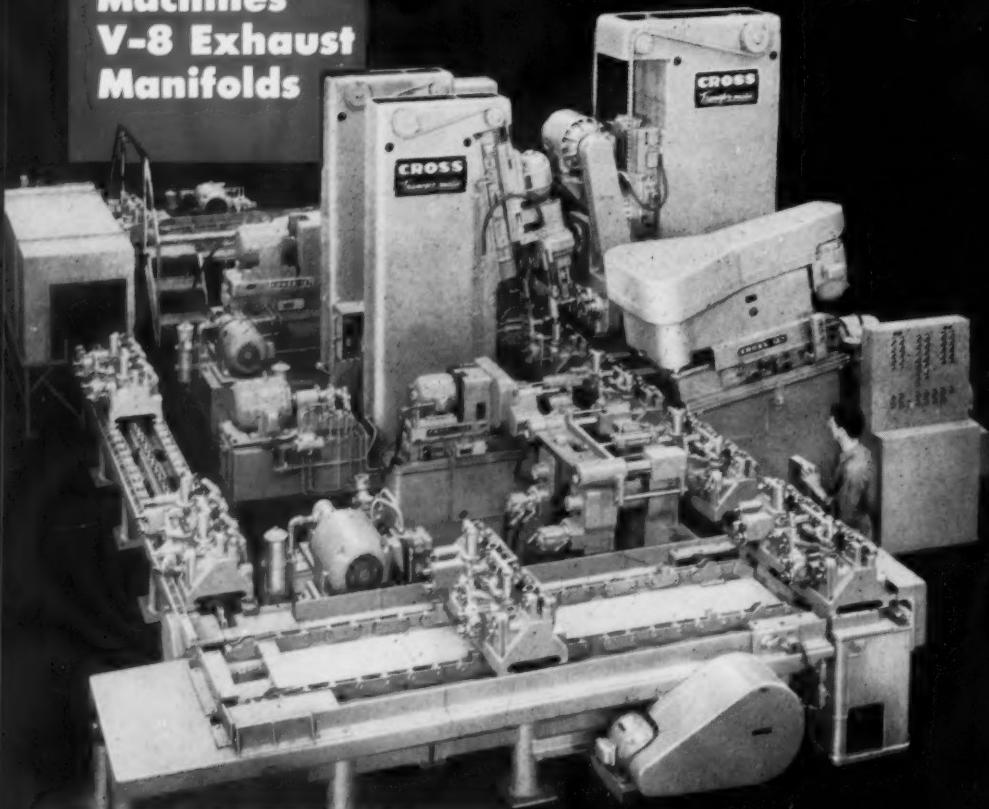
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Completely Machines V-8 Exhaust Manifolds

Another Transfer-matic by Cross



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- ★ Automatic power wrench for operating work holding fixtures.
- ★ Automatic transfer mechanism.
- ★ All parts in Cross machines—even tooling details—are made to interchangeable tolerances for fast, easy maintenance.
- ★ Other features: Construction to JIC standards; hardened and ground ways; hydraulic feed and rapid traverse for milling, drilling and boring; individual lead screw feed for tapping.



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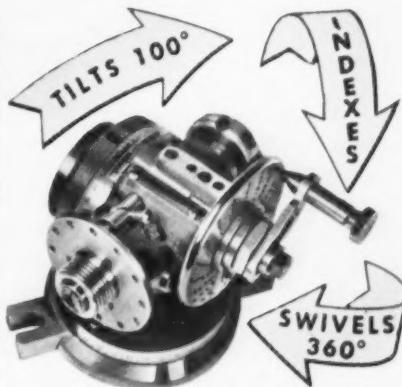
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April, 1956



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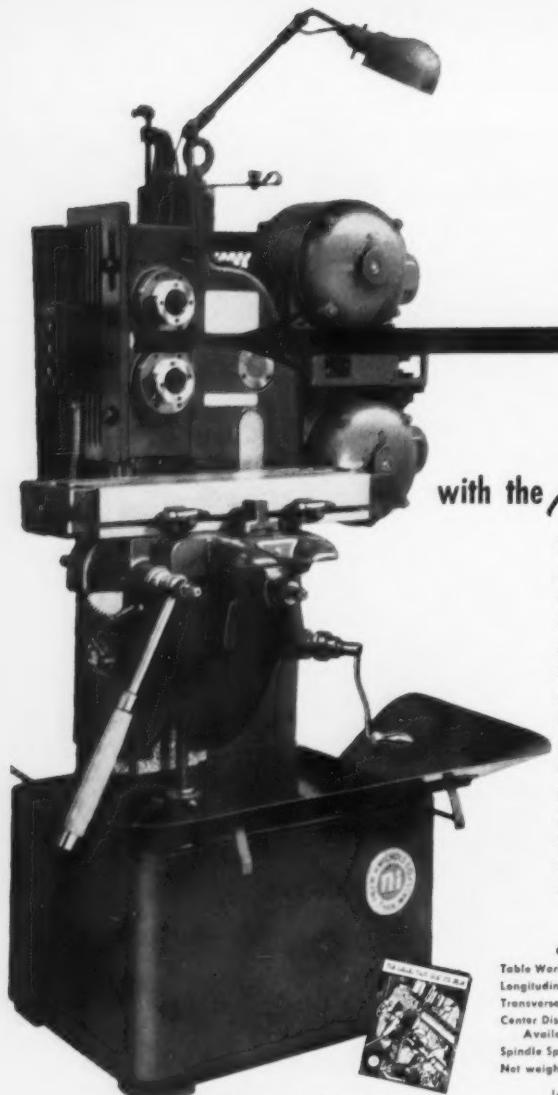
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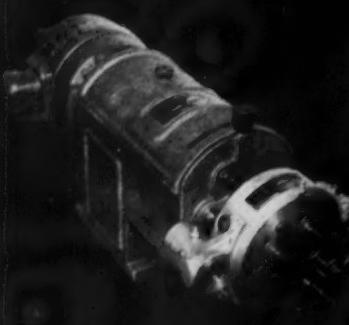


REVERSE

removes taps

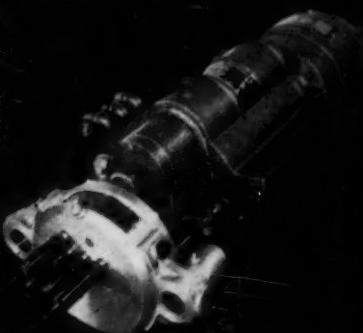
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THE A.T.U. TAPPING UNIT



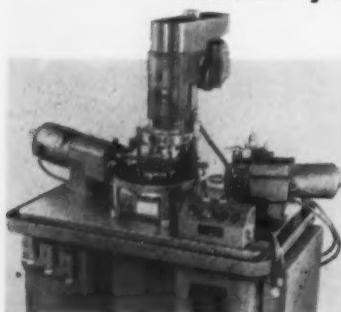
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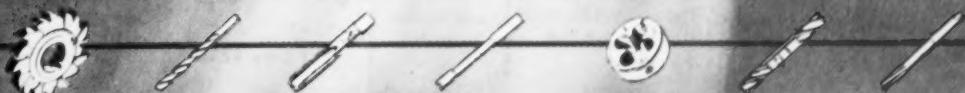
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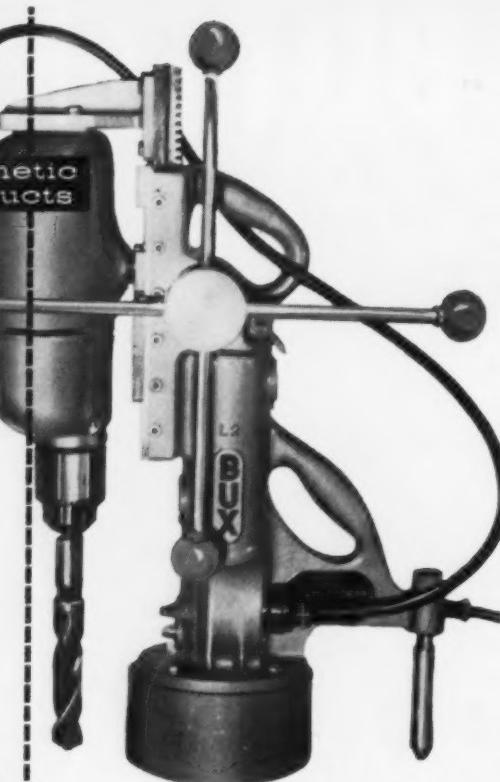
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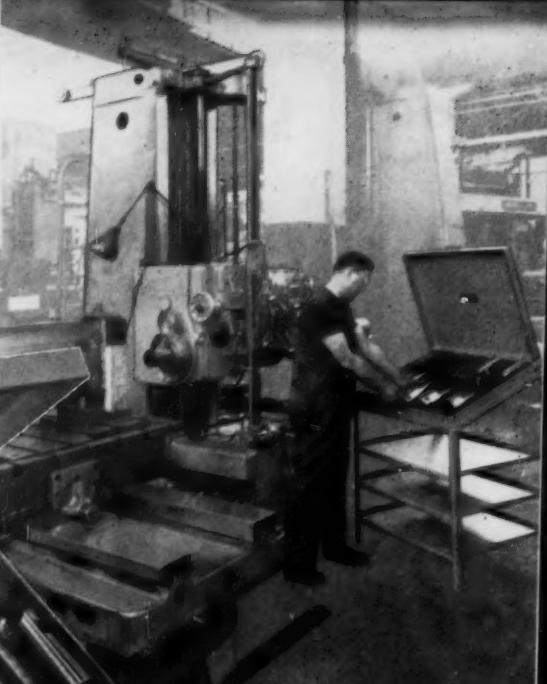
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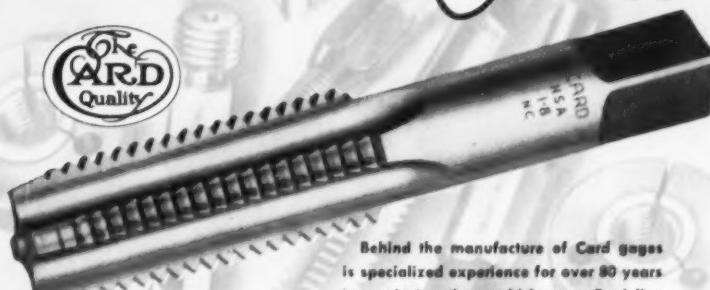


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April, 1956

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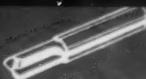
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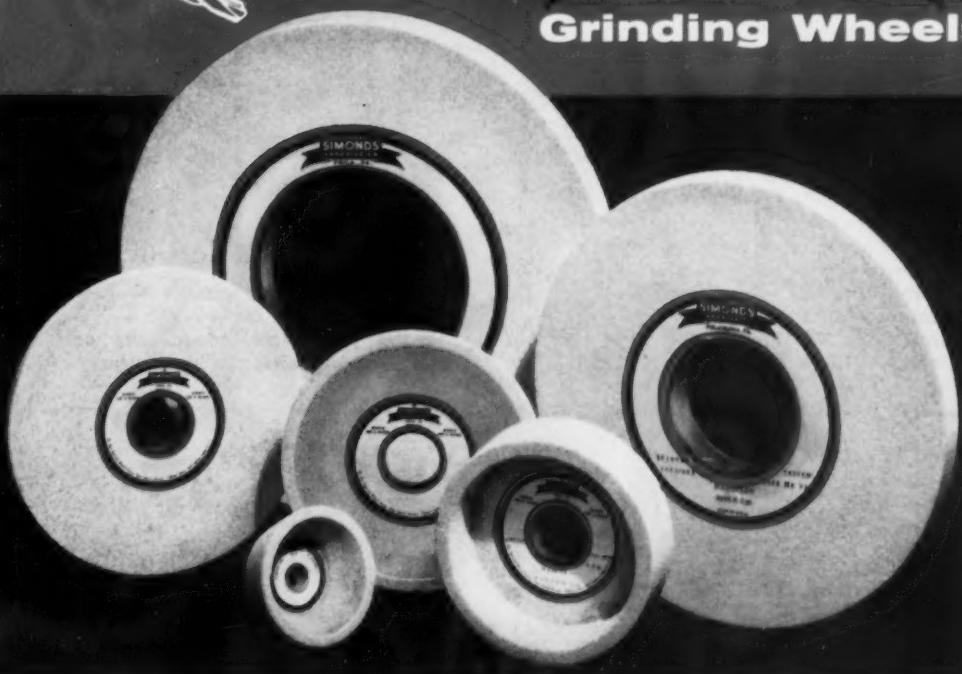
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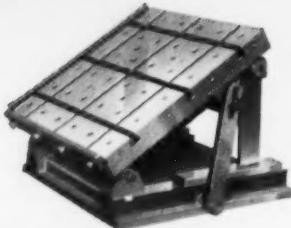
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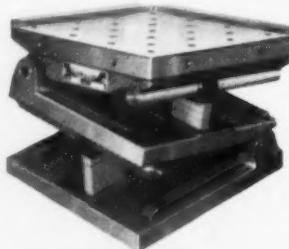
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Set up and grind any single or compound angle fast! Work is held securely by magnetic attraction, clamped or released in an instant. Work can't warp or move.



**INSPECTION SINE PLATE FOR
EVERY INSPECTION OPERATION**

Eliminate chance of errors in inspection department and tool room! No more V-blocks, angle plates, or complicated built-up sets of blocks. Simple, fast and sure.

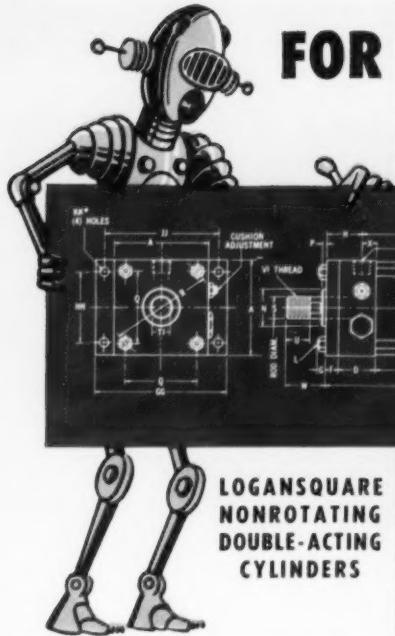
Write or call for complete information now!

OMER E.
24800 PLYMOUTH ROAD

Also producers of special machinery, gages and fixtures

Dept. B-7

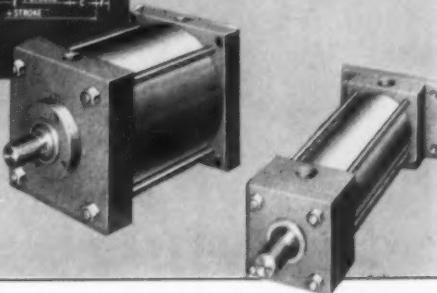
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FOR AUTOMATION IT'S **Logan**

AIR AND HYDRAULIC
FLUID POWER
EQUIPMENT

**LOGANSQUARE
NONROTATING
DOUBLE-ACTING
CYLINDERS**



Bore	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	GG	HH	JJ	KK	AD	AE	
													+ .000	- .003	P	+ .005	R	S	T	U	V	W	X	GG	HH	JJ	KK	AD	AE
1½	2	4	1	3½	3½	5	5	1½	7½	12	2½	5	1½	7½	1.558	2½	7½	12	2½	5	1½	7½	1½	3½	1½	2½	—	—	
2	2½	4	1	3½	3½	5	5	1½	7½	12	2½	5	1½	7½	1.856	2½	7½	12	2½	5	1½	7½	1½	3½	1½	2½	—	—	
2½	3	4½	1	3½	3½	5	5	1½	7½	12	2½	5	1½	7½	2.099	3½	7½	12	2½	5	1½	7½	1½	3½	1½	2½	—	—	
3	3½	5	1½	3½	3½	5	5	1½	7½	12	2½	5	1½	7½	2.651	3½	1	7½	12	1½	1½	7½	1½	5½	2½	4½	—	—	
4	4½	5½	3½	3½	3½	5	5	1½	7½	12	3	5½	2½	5	3.402	4½	1	7½	12	1½	1½	7½	1½	6½	3½	5½	7½	—	
5	5½	5½	3½	3½	3½	5	5	1½	7½	12	3½	5½	2½	5	4.154	5½	1½	7½	12	1½	1½	7½	1½	7½	4½	6½	—	—	
6	6½	6½	3½	2	2	5	5	1½	7½	12	3½	5½	2	5	4.993	7½	1½	7½	12	1½	1½	7½	1½	8½	4½	7½	—	—	
8	8½	8½	3½	2	2	5	5	1½	7½	12	3½	5½	2	5	6.452	9½	1½	7½	12	1½	1½	7½	1½	—	7½	—	1½	10½	—

Dimensions apply to no-stroke assemblies. Pipe thread is American [National] "Dryseal." Dimensions for cushioned and noncushioned are identical. All dimensions are given in inches. *Use bolts 1/8" smaller than "KK" (mounting holes).

Broad selection of mountings and mounting combinations. Pressures up to 150 psi air; up to 500 psi oil.

FREE CATALOGS ON REQUEST

YOUR DEPENDABLE
SINGLE SOURCE FOR ALL YOUR
AIR AND HYDRAULIC EQUIPMENT

Logan

MEMBER Nat'l. Mach. Tool Builders'

Assn. Nat'l. Fluid Power Assoc.

PROPERLY DESIGNED — PROPERLY EQUIPPED

LOGANSPORT MACHINE CO., INC.
805 CENTER AVENUE, LOGANSPORT, INDIANA

PLEASE SEND COPY OF CATALOG:

- 100-1 AIR CYLINDERS
- 200-1 HYD. POWER UNITS
- 100-2 MILL-TYPE AIR CYLINDERS
- 200-2 ROTOCAST HYD. CYLINDERS
- 100-3 ULTRAMATIC CYLINDERS
- 200-3 7½ SERIES HYD. CYLINDERS
- 100-4 AIR VALVES
- 200-4 HYD. VALVES
- 100-5 LOGANSQUARE CYLINDERS
- 200-5 FITTINGS
- 200-6 CHUCKS
- 200-7 PRESSES
- ABC BOOKLET
- FACTS OF LIFE
- CIRCUIT RIDER
- 47 SURE FLOW PUMPS

TO:

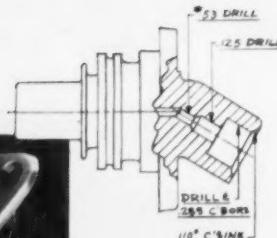
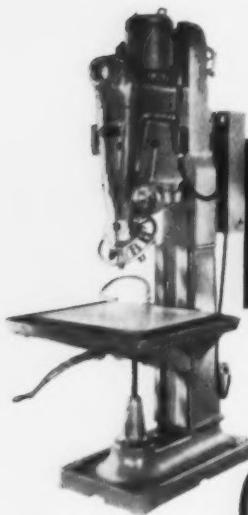
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TITLE _____

COMPANY _____

ADDRESS _____

For more data circle 264 on Reader Service Card



hf TURRET DRILL PAID FOR IN 6 MONTHS BY SAVINGS IN REJECTS ALONE

hf
**TURRET
DRILL
CASE
HISTORY
No. 26**

MANUFACTURER—Clifford Manufacturing Company,
Waltham, Massachusetts

PART—Tellurium Copper Forging

Fixture—Single position, bolted to machine table
OPERATIONS

1. Load.
2. Combination center and countersink, 750 r.p.m. Index.
3. Rough drill .285 diameter, 550 r.p.m. Index.
4. Drill $\frac{1}{8}$ " diameter, .440 deep, 1450 r.p.m. Index.
5. Drill #53 .610 deep, 2875 r.p.m. Index.
6. Finish counterbore .285 diameter, .250 deep, 1000 r.p.m.
7. Unload and Clean.

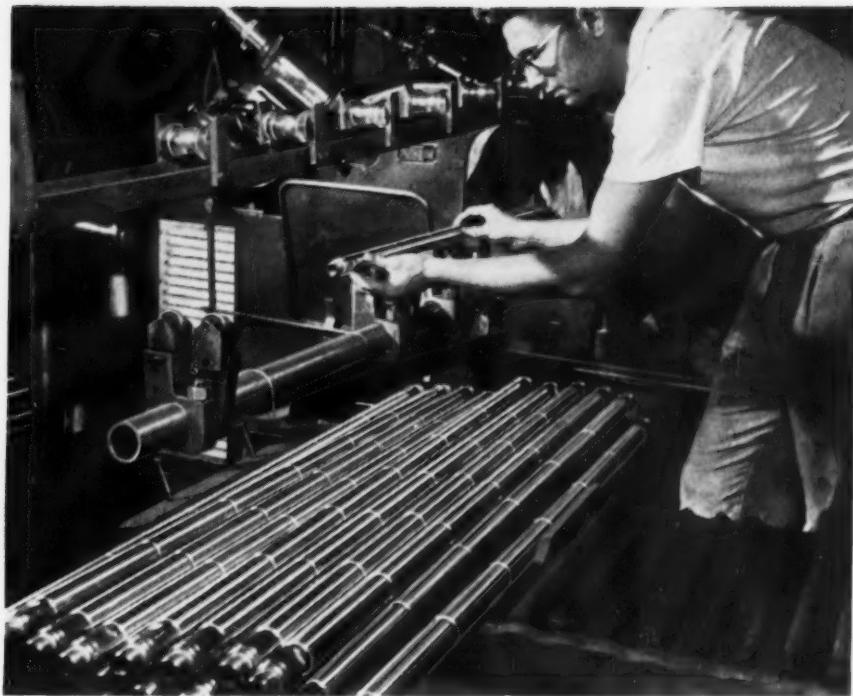
Production Rate	On H&F Turret Drilling Machine	On Conventional Multiple Spindle Drill Press
Pieces per hour	30	16
Inspection	10%	100%
Rejects	1.5%	10%

Note that the H&F machine has increased production 87%, cut inspection time 90% and rejects 85%. As the parts are worth \$12 each, the savings in rejects alone paid for the H&F machine in 6 months.

COMMENT With the H&F machine, each spindle works on a common axis and runs at an optimum pre-set speed to an accurate preset depth. • The work is correctly positioned for each operation by a fixture bolted to the machine table. • Production is substantially increased because no time is lost moving work from spindle to spindle or sharpening tools dulled by contact with jig bushings. • Rejects are virtually eliminated because correct spindle speeds and accurate alignment of tool and bushing produce straight holes with a good finish. • Let H&F save money for you. • Write for catalog and further time studies.

HOWE & FANT, INC., 29 FITCH STREET, EAST NORWALK, CONN.

For more data circle 265 on Reader Service Card



THREE SIZES OF TUBING IN ONE PUMP ... PRECISELY!

Like so many products, the deep well reciprocating pump manufactured by Fluid Packed Pump Company of Los Nietos, California, is practically all tubing with the exception of fittings used on the end. And because the pump's components are received as tubes—semi-finished products in themselves—they require much less fabrication than would otherwise be necessary.

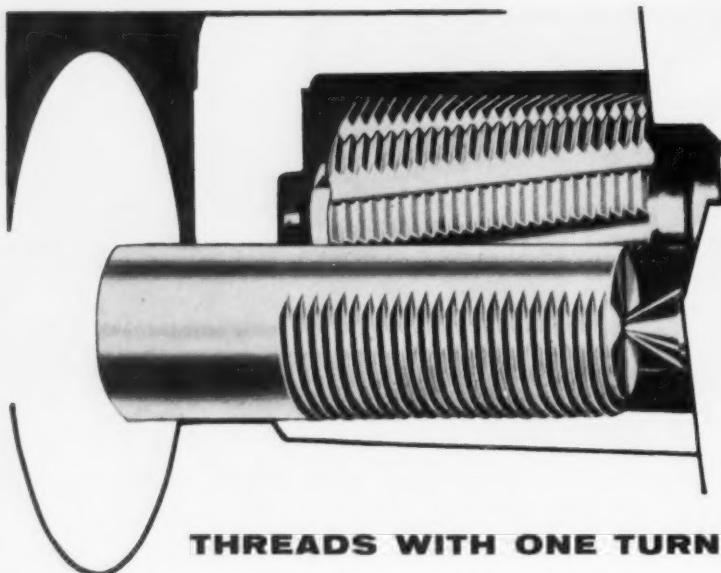
For the past 10 years, this company—an acknowledged leader in its field—has used B&W seamless alloy steel mechanical tubing for its product which pumps oil up from subsurface areas of wells. The barrel and plunger of the pump are precision parts which must be held to extremely close tolerances if they are to function properly. The uniform size, wall thickness and concentricity characteristics of B&W Tubing, with its surfaces free from spiral, scratches and pits, combine to make this tubing ideally suited to the Fluid Packed Pump operation.

A closer look at your own product, from both a design and fabrication standpoint, may reveal opportunities for tubing applications that may save time and money and improve your product. Whatever your requirements, B&W Tubing—carbon, alloy or stainless—can meet them. Call Mr. Tubes, or write for Technical Bulletin 365. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.



Seamless and welded tubular products, seamless welding fittings and flanges—in carbon, alloy and stainless steels

For more data circle 266 on Reader Service Card



THREADS WITH ONE TURN!

Hanson-Whitney Thread Milling Machines* produce threads with approximately one revolution of the work. Unusual versatility . . . cutting internal, external, straight or taper, left or right hand threads. An exclusive cam design eliminates back lash . . . provides complete automatic cycle for lead, depth, rapid retraction for gaging or loading. Hanson-Whitney single source engineering and manufacture of machine

tool, cutting tools, fixtures and gages for screw threads, assures production precision. Consult Hanson-Whitney engineering service, always available in the field or at home offices.

Standard models available in —

4" x 9"	10" x 24"
(hydraulic)	
8" x 16"	15" x 30"

*Available — larger sizes and/or special cycles; automatic loading — rough and finish cycle; extra length beds, oversize swings.

Write for further information and literature

Hanson-Whitney COMPANY

DIVISION OF THE WHITNEY CHAIN COMPANY

173 BARTHOLOMEW AVENUE • HARTFORD 2, CONNECTICUT

TAPS • THREAD GAGES • HOBS • CENTERING MACHINES THREAD MILLING MACHINES AND CUTTERS
For more data circle 267 on Reader Service Card



Find out for yourself the facts about Dimensional Air Gages...it's easy!

There's a lot of confusing talk today about the merits of various air gages. It's difficult to learn the true facts. Each manufacturer of air gages naturally claims his is superior. So how are you going to determine which, in the long run, is the best for you to buy?

Find out the facts for yourself. You don't have to accept any gage manufacturer's claims. We invite you to let us put a Dimensionair right in your own

shop so that all personnel involved can operate and compare it with any other air gage on the market.

Forget all about sales pitches and competitive arguments. You make the decision yourself. After comparing the Dimensionair with the air gages now in your plant, or directly in competition with any other air gages, make your decision entirely on the basis of your own actual tests and comparisons. *You* be the judge!

Ask **FEDERAL** *First*

FOR RECOMMENDATIONS IN MODERN GAGES . . .

Dial Indicating, Air, Electric, or Electronic — for Inspecting, Measuring, Sorting, or Automation Gaging

Find out which is
the best air gage
for your plant.
Send us this coupon:

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6144 Eddy Street • Providence 1, R. I.

We'd like to test a Dimensionair in our plant.

Company Name _____

Your Name _____

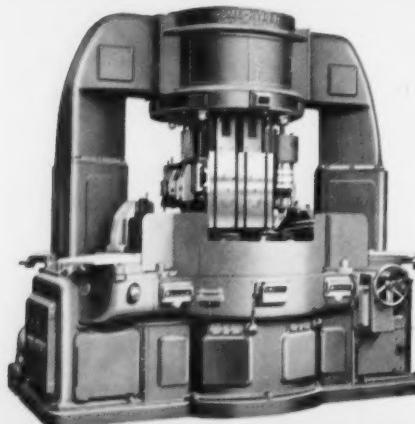
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14" ACME

8-SPINDLE VERTICAL HYDRAULIC



OFFERS MORE
of what you need in a Vertical Chucking

- ★ Sturdy arch frame and massive base construction provides rigid support for top housing and vertical toolslide column.
- ★ Four independently-operated cross slides.
- ★ Feed control of all toolslides by positive cam control.
- ★ Eight vertical toolslides for end-working tools and attachments.
- ★ Wide range of feeds and spindle speeds, with 3-speed selectivity at each work station.
- ★ Operating controls conveniently located at front and rear of machine.

THE NATIONAL ACME COMPANY

170 EAST 131ST STREET • CLEVELAND 8, OHIO

RYDER

CHUCKING AUTOMATIC

also built in
6-spindle, 17-inch
capacity



Introduced by
**NATIONAL
ACME**

*in response to
today's NEED
for SPEED*

New

13" PRECISION TURRET LATHE

ACCURATE
FAST
DEPENDABLE



HARDENED BED WAYS

Hardened and precision ground bed ways and cross-feed screw can be supplied in lieu of regular at small extra cost.

**SOUTH
BEND**



The production of small parts requiring both exacting tolerances and high output calls for this new turret lathe. In it has been combined machining speed, handling ease, accuracy and rigidity for producing utmost efficiency on every job.

Its exceptional ranges of facing, turning, ram and threading feeds are a match for every machining condition. Handling is fast and easy as excess weight has been avoided. Time-proven design and careful workmanship give it accuracy for years to come.

Send for complete information if you are interested in producing more precision parts at lower costs.

SPECIFICATIONS: Swing 13 $\frac{1}{8}$ " • Collet capacity 1" • Spindle bore 1 $\frac{3}{8}$ " • Turret ram effective feed 6 $\frac{1}{2}$ " • Turning feeds 48 • Facing feeds 48 • Threading feeds 48 • Turret feeds 144 • Spindle speeds 12 • Prices start at \$2,344.

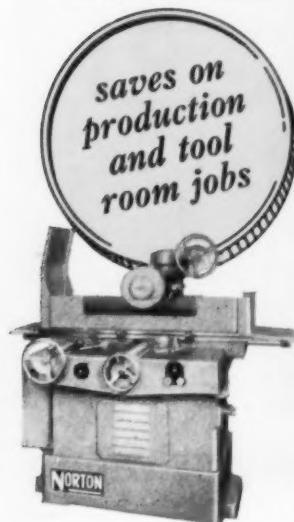
SOUTH BEND LATHE

South Bend 22, Indiana

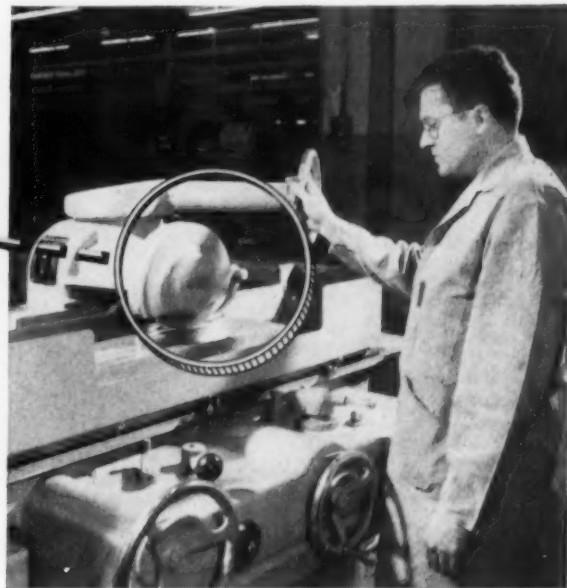
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Easy to set up... Easy to operate...

*This Norton 8"
Surface Grinder*



saves on
production
and tool
room jobs



Here's a rugged machine that sets up quickly for production runs and maintains steady accuracy on small parts. And it's just as efficient for grinding a variety of small units in tool room work.

Designed with both hand and hydraulic table traverse and cross feed, the Norton 8" x 24" hydraulic surface grinder produces plane surfaces smoothly and speedily. Convenient controls and easy accessibility keep operating and maintenance time low — while the quick, easy set-ups cut your unit costs on job after job.

Write for Catalog 190 on this popular, money-saving Norton surface grinder, or for literature on its 6" and 10" companion

For more data circle 271 on Reader Service Card

models. And remember — only Norton offers you such long experience in both grinding wheels and machines to help you produce more at lower cost. **NORTON COMPANY, Machine Division, Worcester 6, Mass.**

To Economize, Modernize With NEW

NORTON
GRINDERS and LAPPERS

Making better products...to make other products better

District Sales Offices: Worcester • Hartford
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"RODGERS PLATEN PRESS GIVES US

**FAST CYCLING
WITH
COMPLETE SAFETY**

—SAYS VEIT AND YOUNG

Rodgers 400-ton platen press in use at Veit and Young, Huntingdon Valley, Pa., metalworking specialists. The press is equipped with die cushion, fast cycling cylinders and other accessories. Some of the products formed are stacked by the press.

Production has been increased in drawing and forming large serving trays and electrical panels by Veit and Young with their Rodgers Platen Press. Safety controls permit operators to concentrate on speed and accuracy. They are working type 303 stainless steel, brass, carbon steel, aluminum—from $\frac{1}{32}$ " to $\frac{1}{8}$ " thick with bends up to 90°.

Auxiliary cylinders lower and

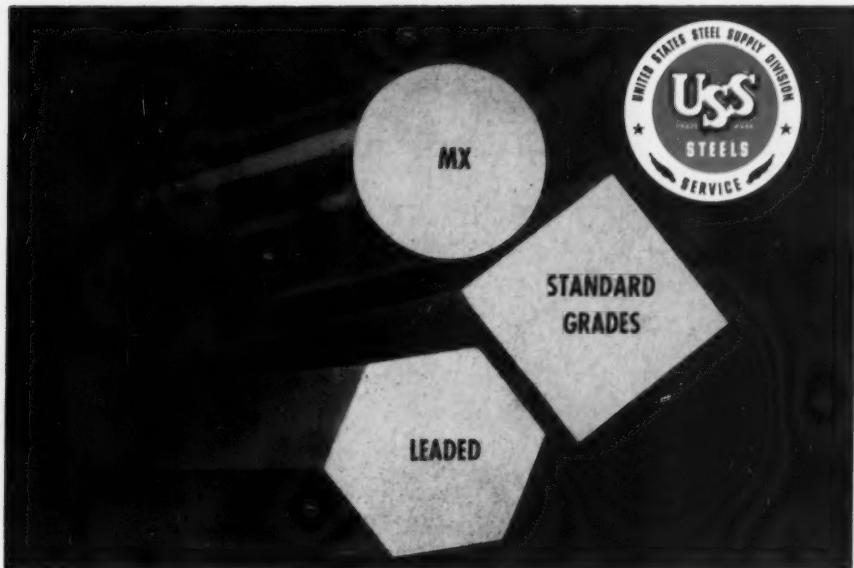
raise platen quickly for fast cycling. Forming pressures are preset from 80 to 400 tons—die cushion up to 50 tons. Simple, fast adjustments govern all platen, pressure and time cycles. If you work in metal, plastic, rubber, veneers—you can mold, draw, form—*faster* with a Rodgers Platen Press. Capacities 10 to 600 tons. Send for Rodgers "Blue Ribbon" Platen Press Catalog.



Rodgers Hydraulic Inc.

7447 WALKER STREET • MINNEAPOLIS 26, MINN.

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You get the right COLD FINISHED BARS for your job!

Carbon, Alloy and Stainless Shapes . . . all available for immediate shipment.

Our USS MX Free Machining bars have earned great popularity as one of the best high speed screw stocks because it cuts unit costs considerably . . . an average of 10% to 15%, sometimes as high as 42%. MX costs no more than B-1113 and it will increase your net production 20% or more.

LEADED Screw Stock, very fast machining, is especially economical on long production runs of small parts that require extensive machining.

Because U. S. Steel Supply carries all types, sizes, shapes and finishes, we can help you select the RIGHT Cold Finished Bars for your requirements—and the right quality is not always the most expensive.

U. S. STEEL SUPPLY DIVISION

General Offices
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Coast to Coast

UNITED STATES STEEL

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April, 1956

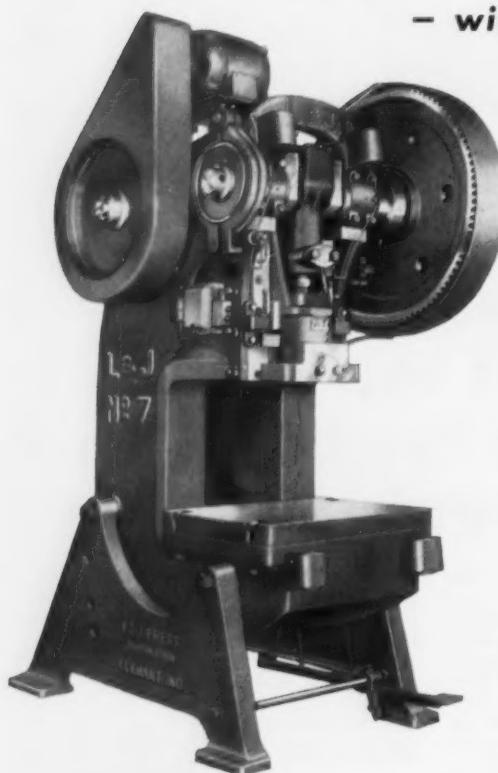
modern machine shop 71

NEW L&J NO. 7 PRESS

RIGID — ACCURATE — EFFICIENT

— with a LARGER

WORK AREA



This new press will give you greater production at lower cost. Its alloy iron frame has exceptional rigidity which holds deflection to a minimum and gives closer tolerances, greater uniformity and longer die life. Accuracy is also obtained through adjustable gibs of extra length. The rugged ram adjusting screw has buttress threads and replaceable hard bronze seat. Air clutch optional. Geared and non-gearied models.

Specifications: capacity 75 tons, standard stroke 4", strokes per minute 42 (non-gearied 85), die space 14" to 22".

Write for Catalog
20 O.B.I. models — 14 to 90 tons



L&J PRESS CORPORATION
1624 STERLING AVE., ELKHART, INDIANA

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**For heavy duty
precision
drilling . . .**

It's a

Jacobs

CHUCK

Jacobs and your industrial supply distributor are ready to deliver the chucks you need and the service you deserve. First in chucks . . . first in service.

THE JACOBS MANUFACTURING COMPANY • WEST HARTFORD, CONN.



The Jacobs Model 91 Spindle Nose Collet Chuck for tool room and engine lathes.



The Jacobs Rubber-Flex® Tap Chuck for tapping heads and impact tools.



The Jacobs Ball Bearing Super Chuck for heavy duty and precision industrial use.



The Jacobs Model 96 Collet Chuck for grinding machines, millers and jig-borers.



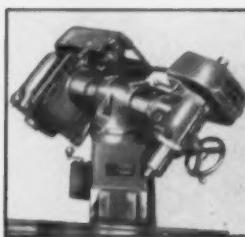
The Jacobs Plain Bearing Chuck for drill presses, portable electric and air tools.



The Jacobs Impact Keyless Chuck especially designed for the aircraft industry.

"CLAUSING VERTICAL

*are perfect for all milling operations
within their capacity!"*



The Heart of the CLAUSING MILL is its rigid, high precision spindle head. It has 7 ball bearings — spindle is chrome nickel steel, hardened and ground — quill, ground and hard chrome plated, has full-length honed bearing seat — overarm is an electric furnace casting, with $\frac{3}{4}$ " thick walls, precision ground.



The spindle head can be swiveled in a vertical plane and set at any angle, and turret rotated in a horizontal plane making it possible to mill, drill, bore, ream and shape at all angles with one set-up. Quill has micrometer depth control stop and two feeds, lever and hand wheel.

Grazale Tool and Gauge, Inc., East Detroit, Michigan, specialists in experimental work on precision aircraft and automotive parts, and on three-dimensional cams, have this to say about the Clausing milling machines: "Clausing mills are perfect for all milling operations within their capacity. We like them especially well for small-parts work — they are accurate, sensitive, easy to set up — and, they are economical in that they eliminate tying up larger, more costly machines on small-parts operations."

The New CLAUSING VERTICAL MILLER is a precision machine tool designed for jig, die and fixture making . . . pattern, experimental and tool room . . . and general production milling. Many new and exclusive features give it greater versatility and ease of set-up and operation than have ever been available in a miller at or near its price — now only \$795.00, F.O.B. Factory. Your CLAUSING dealer will gladly give you complete information on this outstanding machine — call him today!

MOST ACCURATE MACHINE OF ITS TYPE!

The CLAUSING Vertical Miller is the most accurate machine of its type and price! Before it leaves the factory each CLAUSING must pass rigid tolerance tests — such as:

1. Top of table perpendicular to column ways, both directions, within .0005" in 8" travel.
2. Table top, front to back, square with column ways 0 to .001".
3. Table, parallel to turret within .001".
4. Spindle square with table, front to rear, within .001" T.I.R. in 5" circle.
5. Spindle taper (internal) run out within .0002" at spindle nose.
6. Table T-slots parallel to table dovetail ways within .0005" in 8" longitudinal travel.

CONDENSED SPECIFICATIONS

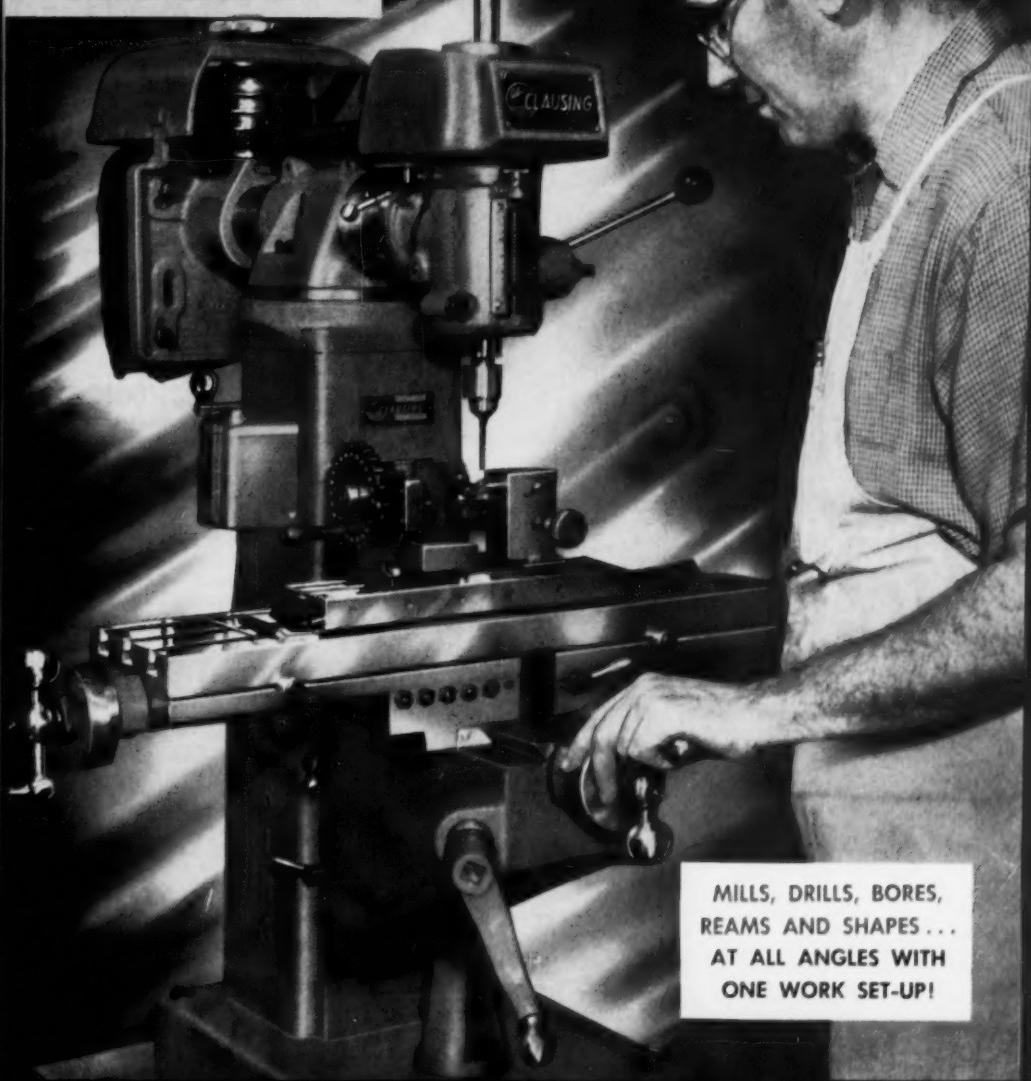
Size of Table.....	6" x 24"
Longitudinal Table Travel.....	15"
Transverse Table Travel.....	5"
Vertical Table Travel.....	11 $\frac{1}{2}$ "
Maximum Distance Spindle to Table.....	11 $\frac{1}{2}$ "
Maximum Distance Spindle to Column.....	8 $\frac{1}{2}$ "
Quill Travel.....	3"
Spindle Speeds: Six, 180 to 3250 R.P.M. — No. 7 Brown and Sharpe or No. 2 Morse Taper Spindle, Optional — Operates from $\frac{1}{2}$ or $\frac{3}{4}$ HP, 1725 R.P.M. Motor.	

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MILLS, DRILLS, BORES,
REAMS AND SHAPES . . .
AT ALL ANGLES WITH
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Quality Machine Tools Since 1888
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Electrical Discharge Machining

saved \$448
sinking this
forging die
using BRASS electrodes

Conventional Method

Mill Cavity (Man and Machine)	56 hours
Hand Finish (Experienced die sinker)	52 hours
TOTAL	108 hours

ELOX method

Forge Electrode (Man and machine)	2 hours
Set up and change electrodes (man and machine)	8 hours
Machine hours only (no operator required)	32 hours
Hand finish after E.D.M.	2 hours
TOTAL	44 hours

Saved: 64 hours at \$7 per hour

additional EDM advantages in forge die machining:

- Dies are fully heat treated prior to machining thus eliminating possible distortion.
- Resizing forging dies after washout can be done within two hours.
- Inherent workhardening values are retained in the dies since no additional re-heat treating is necessary.
- Actual die life is increased.
- Many forge die alloys are self-polishing after EDM.

This machining application is one of many time and material saving jobs being turned out by the standard Elox M-500 Electronic Machine Tool. See EDM in operation at Elox Demonstration Centers.

*T.M. Reg.

elox
corporation of michigan

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Royal Oak 3, Mich.

Elox Electron Drills for removing
broken tops, drills, etc., from \$495
to \$3450.

DEMONSTRATION CENTERS

Plant—Royal Oak, Mich.
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For more data circle 278 on Reader Service Card

GETTING BETTER THREADS

... in Less Time... at Lower Costs
is Coulter Magic!

Day-in and day-out production figures show that COULTERS produce threaded parts FASTER . . . AUTOMATICALLY . . . on non-ferrous and heat treated metals . . . long and short runs . . . all sizes, diameters and lengths . . . high speed production milling. COULTERS start earning their way the moment you make the first threads. Perform with accuracy and ease of handling normally found only on much heavier, more expensive machines.

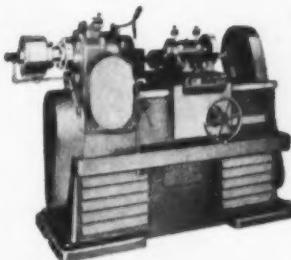
THREE COULTERS for your threading needs

Each machine has its own design features; engineered for low and high speeds, quick changeovers, individual versatility.

1

"H1" Completely automatic for precision internal and external right and left hand threads, 4 to 50 per inch. Internal: $\frac{5}{8}$ " to 8". External: $\frac{3}{16}$ " to 7".

Coulter Threading Machines



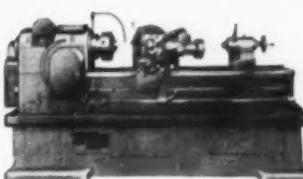
2

TYPE "A" MODEL "LI"
This is the most versatile lathe built for fast production of Square, Standard and 29 degree threads, internal and external. Has over 25 alternatives for setting up the threading tools. Capacities: up to 195" length of thread.



3

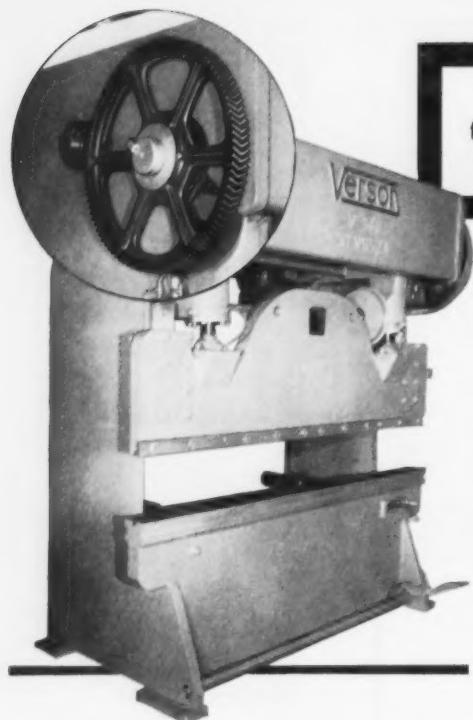
"THREADMASTER" Produces, automatically, long and short traversing, elevating, cross feed lead screws with over 55 changes of the work spindle. Mills threads from 1/3 to 20 per inch and leads from .05 to 5.5".



Ask your COULTER Dealer about them today, or write direct.

The *James* Machine Tool Builders Since 1896
Coulter Machine Co.
641 Railroad Ave., Bridgeport 5, Conn.

For more data circle 279 on Reader Service Card



*These are the features
that make — **Verson**—
brakes your best buy*

**HERRINGBONE
DRIVE GEARS**
assure long life,
smooth, quiet
operation
with



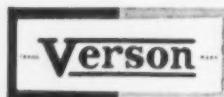
PRESS BRAKES

Typical of the advanced design of all Verson machines is the gearing employed in Verson Press Brakes. Drive pinions and gears of all Verson Press Brakes are of the continuous herringbone type.

Herringbone gearing is just one of the quality features built into Verson Press Brakes to assure you of the best value. From the thick and deep bed and ram sections to the spring loaded, mechanically actuated shoe type brake, Verson Press Brakes are designed and built to give longer life and better performance in every way.

Whatever your needs it will pay you to bring them to Verson. For specific recommendations, send an outline of your requirements, or write for Catalog B-55.

A Verson Press for every job from 60 tons up.



ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION
VERSON ALLSTEEL PRESS CO.

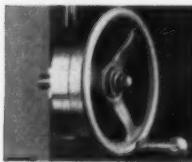
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MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES
TOOLING • DIE CUSHIONS • VERSON-WHEELON HYDRAULIC PRESSES

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Accurate Grinding

FOR
SMALL
PARTS



ACCURATE SPINDLE ADJUSTMENT

Standard vertical adjustment of spindle through handwheel is .0005". With Vernier attachment, spindle can be raised accurately to .00005".



SOLIDLY SUPPORTED SPINDLE CARRIER

Spindle carrier is moved vertically on double dovetail ways with adjustable tapered gibbs.

■ The Hammond No. 2, 6" x 18", Surface Grinder is a precision tool room machine for use on the most accurate gauge and tool work.

The standard spindle is direct motor driven and is mounted on precision preloaded ball bearing. Total vertical adjustment is 10 1/4". In and out movement of table is 6 1/2" with a longitudinal travel of 18".

Write or wire for further information.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

Detroit Office: General Motors Building

CONVENIENT HAND CONTROL

Handy wheels for cross travel, accurately gauged to thousandths, and quick acting longitudinal travel.



SMOOTH ROLLER CHAIN TABLE DRIVE

Remarkably smooth finish on work without chatter marks frequently found when table is moved by conventional means through rack and pinion.

FOOTBURT

SURFACE GRINDING

For more data circle 281 on Reader Service Card

IN MOST SET-UPS

THE WORK IS HELD RIGID... THE GRINDING WHEEL TRAVERSES...

PROVIDING

- EXTREME ACCURACY
- SIMPLICITY
- ECONOMY

THE

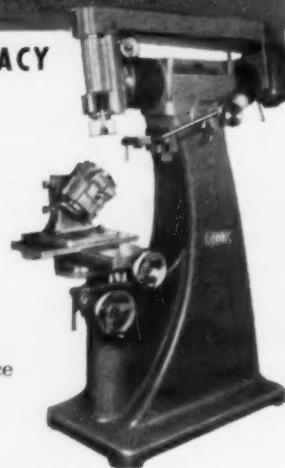
Oliver ACE CUTTER GRINDER

Look into the advantages of the Oliver Ace . . . Replace outdated methods and save. With the Oliver Ace, two fixtures handle a complete range of tool and cutter grinding. Two models are provided . . . Heavy-Duty Model illustrated for tungsten-carbide cutters and tools, and Standard Model for high speed and light duty carbide grinding. The Oliver is better for sharpening:

- | | |
|----------------------------|-----------------------|
| ★ SIDE AND FACE CUTTERS | ★ COUNTERBORES |
| ★ FACE MILLS AND END MILLS | ★ COUNTERSINKS |
| ★ SLAB MILL CUTTERS | ★ REAMERS |
| ★ ANGLE CUTTERS | ★ SPOT FACING CUTTERS |

THE OLIVER ACE WILL HANDLE NEARLY ALL CUTTER GRINDING REQUIREMENTS. EXCELLENT FOR THE SHARPENING OF TUNGSTEN-CARBIDE TIPPED CIRCULAR WOOD SAWS.

Write for Brochure . . . Complete Details



Oliver INSTRUMENT • COMPANY

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ADRIAN, MICHIGAN

FACE MILL GRINDERS • AUTOMATIC DRILL GRINDERS • DIE MAKING MACHINES
TOOL & CUTTER GRINDERS • DRILL POINT THINNERS • TEMPLATE TOOL GRINDERS

For more data circle 282 on Reader Service Card

ETALON #17

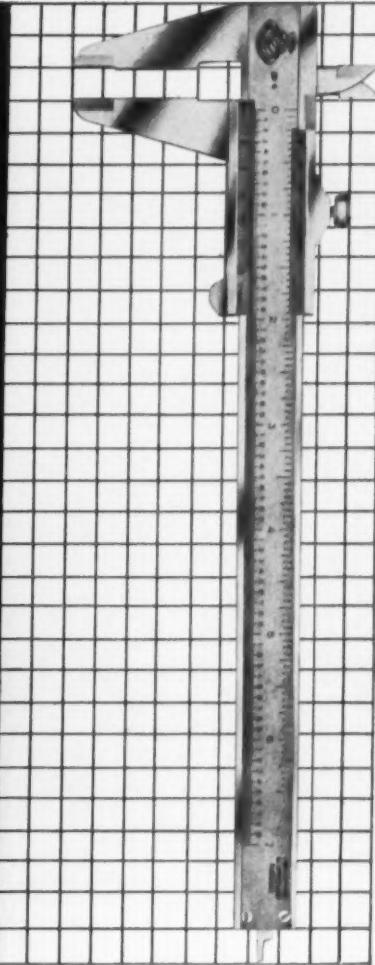
PRECISION VERNIER CALIPER

Dull chrome plated,
will not crack or peel
Exceptionally easy to read
Clear, wide Vernier slide
Hardened Stainless Steel
Read inside, outside and depth
measurements from the same scale
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Precision measuring instruments;
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For more data circle 283 on Reader Service Card



**NEW HEAD CONTROLS
make Fosmatic Radial
easier than ever to run!**

Numerical Dials select feeds and speeds quickly, easily, with minimum possibility of error. Select even while drill is running, to save time on next operation.

Single Control Lever starts, stops, reverses and shifts to feed and speed set on numerical dials.

Push Buttons on quick return levers engage feed. Feed is disengaged automatically by depth control or by pushing either button again. Magnetic clutch needs no adjustment.

Head Traverse Lever also elevates arm. Variable speed hydraulic motors drive both traverse screw and elevating nut. Clutches eliminated.

Other Fosmatic features include: 36 spindle speeds, 18 feeds, 4' to 8' arms, 12" to 19" columns, Boring Type Spindle, Safety Interlocks, Variable-Tension Counterbalance for Spindle, and optional Milling Feed.

NEED DRILLING EQUIPMENT? GET A PROPOSAL FROM FOSDICK!

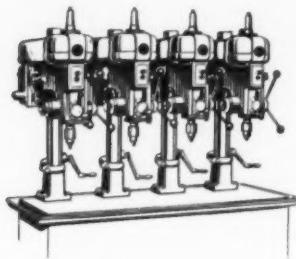


THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

FOSDICK



**6" Spindle travel means
BIG MACHINE capacity
in this 15" Drill Press!**



You don't have to go to a 20" or larger drill press to get 6" spindle travel. With this 15" Walker-Turner, you can drill holes up to 6" deep at one pass of the drill, in diameters from #60 to $\frac{1}{2}$ ".

This extra-capacity "LIGHT-HEAVY-WEIGHT" is built to deliver fast, accurate production drilling in your plant, 24 hours a day, for a long span of years.

1300 Series — Walker-Turner "Light-Heavyweight" 15" Drill Press — full 6" spindle travel; six-spline, full floating

spindle; speeds from 480 to 5000 rpm, depending on motor and pulleys; Jacobs Chuck, or No. 1 Morse taper available. (15" Walker-Turner "LIGHT-HEAVY-WEIGHT" Drill Press with 4" spindle travel — 1200 series — also available.)

Ask your Walker-Turner Distributor to demonstrate the big capacity of this 15" W-T Drill Press. He's listed under "Tools" in your phone book's Yellow Pages. Or write for his name and full specifications on these machines.

DRILL PRESSES, HAND AND POWER FEED — AIR FEED DRILL PRESS ATTACHMENT
RADIAL DRILLS — WOOD AND METAL CUTTING BAND SAWS — TILTING ARBOR SAWS
RADIAL SAWS — JIG SAWS — CUT-OFF SAWS — LATHES — SPINDLE SHAPERS
JOINTERS — BELT AND DISC SURFACERS — FLEXIBLE SHAFT MACHINES



WALKER-TURNER
Division
Kearney And Trecker Corporation • Plainfield, N. J.

For more data circle 285 on Reader Service Card



FASTER

circular precision grinding!

Now with this table and with less effort you assure highest standards of accuracy, flatness, finish and close tolerances. At the same time you eliminate slow and complicated tool setups. You cut grinding time greatly by using only cross feed while the table is rotating at infinite speeds between 40 and 100 RPM.



Work clamped to motorized table, mounted on sine plate. Surface grinder application.

For example, Vulcan's Rotary Table can be used in connection with a sine plate or angle fixture. The dressing of large expensive external wheels for side grinding is therefore eliminated. If you wish we can provide permanent magnetic chucks designed for use with our table, both 6" and 10" in diameter.

Vulcan's Rotary Table is an air operated, self contained unit, portable between bench or machine. A precision center hole for locating and tapped holes in the table for clamping provides easy setup. Circular surface grinder applications are many and varied — grind flanged studs or bushings — bearing spacers — forming rolls — cutters — convex or concave surfaces — punches or dies (radius or angle).

Lapping? Yes — and in micro inches. For the 6" and 10" table, lapping plates of 12" and 16" are provided. Perfect for lapping valve plates, gages, bearing spacers and for carbide lapping using diamond powder. *Write for circular.*

Major Vulcan Services

Engineering, Processing, Designing and Building . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and size. Vulcanaire Jig Grinders . . . Motorized Rotary Tables . . . Plastic Tooling.

720 LORAIN

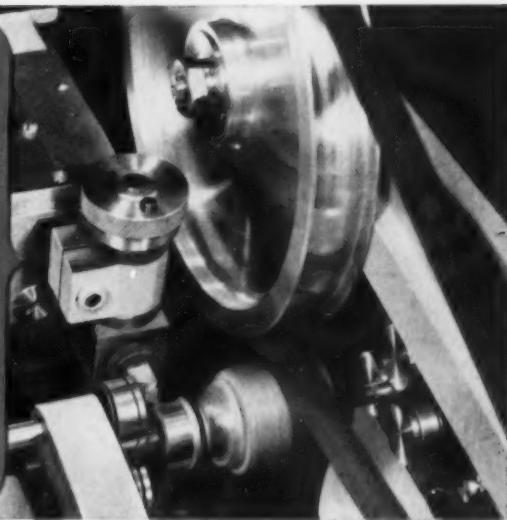
VULCAN TOOL CO.

DAYTON, OHIO

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turn armatures faster, more accurately

with the
RIVETT
IAL
armature
turning
lathe!



concentricity Held to .0002". Commutator turned while armature revolves on its shaft as in normal use. Depth and length of cut performed automatically.

finish Assured by rotating the armature at 7000 r. p. m., and turning with diamond or carbide tool.

speed Achieved by simple, quick method of mounting armature between two supports, bringing armature to top speed, and automatically taking cut!

Get all production facts!

11 sec. tray to tray operation described in bulletin IAL. Write for copy today!

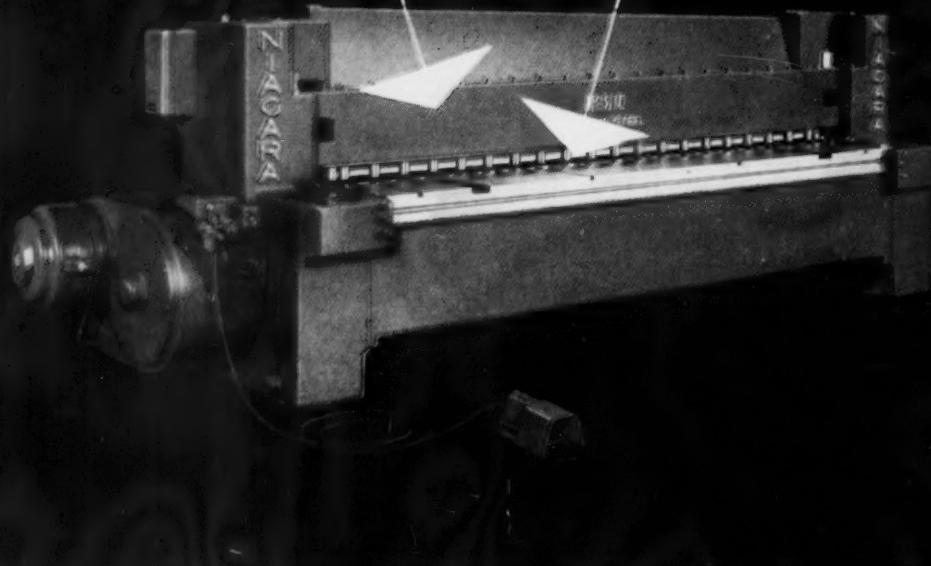


RIVETT

RIVETT LATHE & GRINDER, INC.
Dept. MMR-4 Brighton 35, Boston, Mass.

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SELF-COMPENSATING HOLDDOWN



America's most complete line of presses, shears,
machines and tools for plate and sheet metal work

a BIG FACTOR in the superiority of Niagara Shears

"STRAIGHT-EDGE" CUTTING ACCURACY

Positive, power actuation grips work securely for maximum cutting accuracy.

LOW IMPACT AVERTS DAMAGE AND INACCURACY

Individual pressure feet contact work with low impact, thus safeguarding both the material and bed against damage, as well as reducing noise level. No hammer-blows to mar work. No peening of bed with resulting distortion of knife seat.

SIMPLIFIED, LOW UPKEEP DESIGN

Simplicity of design and construction, involving a minimum number of parts, assures negligible servicing. With less to go wrong, there is less to repair and replace.

HOLDS WORK FLAT AND STATIONARY

Multiple pressure feet on 6" centers, applying uniform pressure, hold work flat and tight against bed to assure utmost shearing accuracy. No rippling of sheet between feet as cut progresses. Firm grip on short pieces.

HANDLES STOCK OF VARYING THICKNESS

Individual feet are self-compensating, requiring no adjustment for cutting stock of different thicknesses . . . even at the same time.

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N.Y.

DISTRICT OFFICES: Buffalo • Cleveland • Detroit

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Dealers in principal U. S. cities and major foreign countries.



In a power squaring shear, no single feature nor component can be fully responsible for accuracy, speed and economy. They result from a combination of features such as the self-compensating holddown; rigid, fully closed box section construction of bed and crosshead; low slope of upper knife; ample and accurately held crosshead guides; multiple point sleeve clutch — the very features that have established the marked superiority of Niagara's Underdrive Series.

For the whole story, straightforwardly presented, on America's most complete line of underdrive power squaring shears, with capacities from shim stock to 1 in. thick mild steel (lengths 3 to 20 ft.), request *Niagara Bulletin 69*. Write today.



NIAGARA

UNDERDRIVE SQUARING SHEARS

Sesco

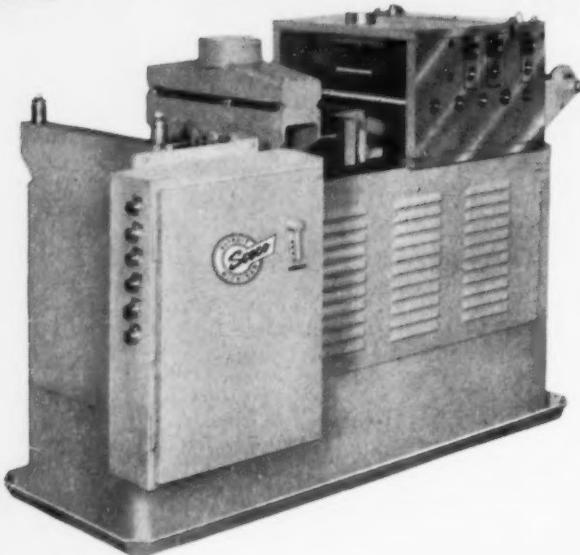
Punch Press Gripper Feed

AMAZING
ACCURACY

ELIMINATES
MISFEEDING

INCREASES
PRODUCTION

PINCH GRIPPING
ASSURES
SCUFF-FREE
FEEDING



For Complete
Pressroom
Automation

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May be attached to your new or present equipment without alteration or re-work of your punch presses. The unit is adaptable to feed from the left, right, front or back. All of the feeding takes place on the upstroke of the press. Models are available to handle stock up to 48" in width and 36" in stroke. This Unit is positive, accurate and reliable.

Sesco
INC.

8881 Central
Detroit 4, Mich.

engineers & manufacturers
of machine tools and
press room equipment

For more data circle 290 on Reader Service Card



Got a pain in the neck?

IF GRINDING PROBLEMS ARE GIVING YOU A PAIN IN THE NECK, SWITCH TO CINCINNATI (PD) WHEELS. For now CINCINNATI Grinding Wheels offer POSITIVE DUPLICATION—a remarkable achievement in precision manufacturing and quality control that *can save you money . . . and increase your production.*

And we're definitely not sticking out our neck when we make these claims, because through the CINCINNATI (PD) Manufacturing Process you are assured Positive Duplication of the original wheel *every time* you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

Yet CINCINNATI (PD) WHEELS are *priced no higher than ordinary wheels*. So, we think you'll agree it's worth investigating CINCINNATI (PD) WHEELS right away.

Just contact us and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

Remember—*only* CINCINNATI Grinding Wheels give you . . .



POSITIVE DUPLICATION

Trade Mark Reg. U.S. Pat. Off.

A Production-Proved Product of the Cincinnati Milling Machine Co.

CINCINNATI
Grinding Wheels

For more data circle 291 on Reader Service Card

This **CINCINNATI**...

1½" thick X 12'

This 15012 Series Cincinnati All-Steel Shear has a 36" gap and a 48" back gauge range.

Power for heavy cutting with accuracy and operating convenience are combined in this machine.

Modern features such as—Hydraulic Holddowns, Front Operated Power Back Gauge, Hinged Back Gauge Angle, Automatic Pressure Lubrication, All-Steel Interlocked Construction, Forged Alloy Steel Eccentric Shaft—all contribute to an outstanding performance with low maintenance and high accuracy.

Write for Catalog S-7.

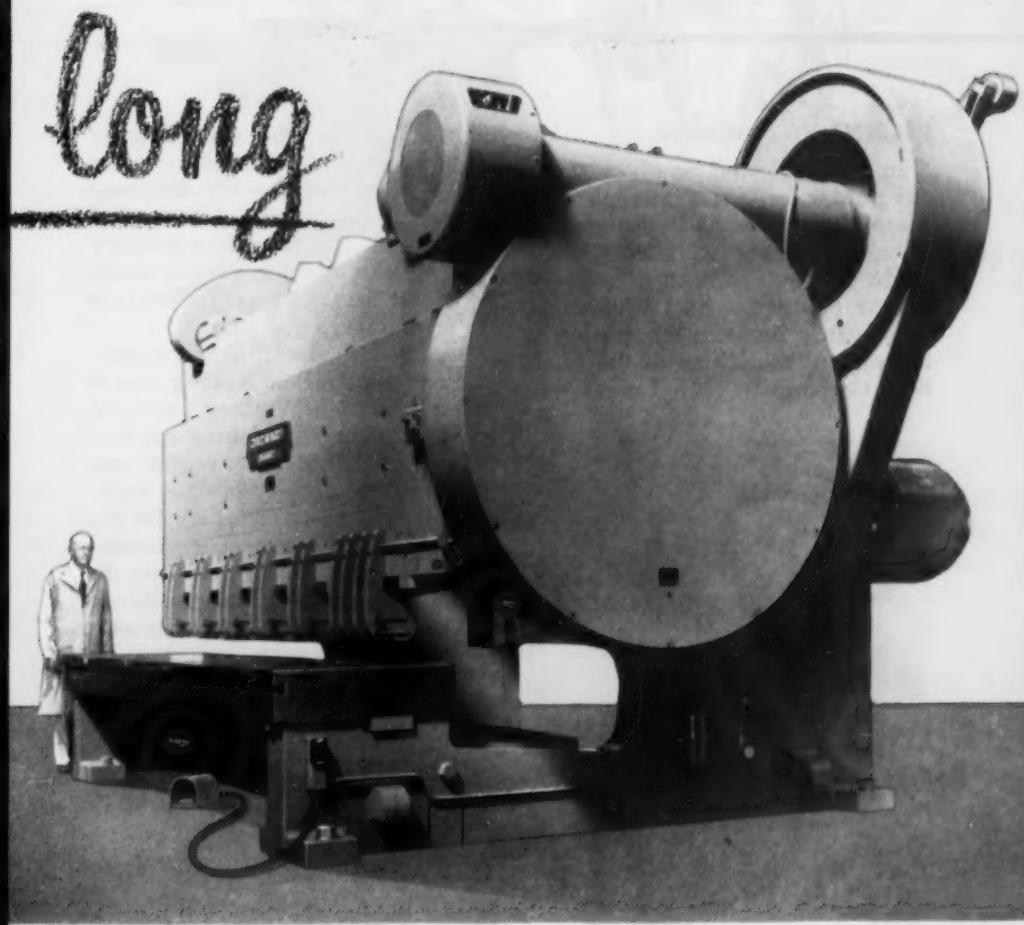


THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

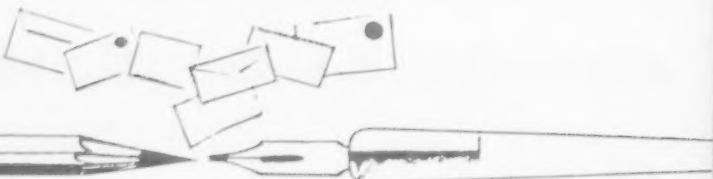
SHAPERS • SHEARS • BRAKES

shears steel plate



See your Cincinnati Representative for
either Heavy or Light Shearing Applications.

OVER THE EDITOR'S DESK . . .



PRESENT-DAY PIONEER

In the hustle and bustle of everyday production it is easy to overlook the fact that among us are people whom tomorrow's history books might very well point to as pioneers. In our opinion, a man who might well qualify for such recognition is the present Chairman of the Sheffield Corporation, Mr. Louis Polk,

because it is Mr. Polk who is, in the greatest measure, responsible for the establishment of the Eli Whitney Metrology Laboratory, a laboratory designed to provide modern industry with the last word in precise measurement testing facilities. (See story on laboratory, Page 132.)

Mr. Polk is shown in the accompanying illustration holding one of the muskets Eli Whitney produced in 1799 in the first historic application of industrial mass production. The bronze plaque in the background honors Eli Whitney for his vision and achievement in demonstrating that, through adequate dimensional controls, it was possible to produce a manufactured article with interchangeable parts.

The dedication of the Eli Whitney Metrology Laboratory in 1956 marks a milestone in industrial progress and a noteworthy achievement for a present-day pioneer.

★ ★ ★

LEST WE FORGET

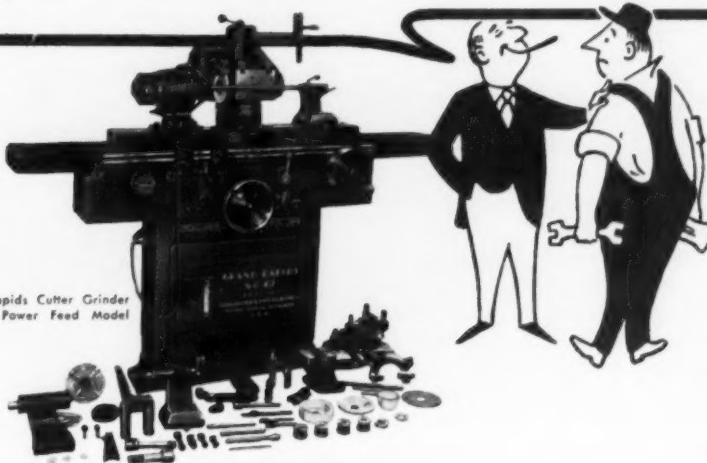
It is highly commendable that individuals here and there as well as a few organizations are working tirelessly to keep alive the interest in America's machine tool resources. Too quickly, it seems, have we been



Louis Polk, Chairman of Sheffield, with one of the muskets Eli Whitney produced in 1799 in first historic application of industrial mass production. The bronze plaque in the background honors the pioneer American inventor.

I'LL DO THE SET-UP ON THE GRAND RAPIDS GRINDER

Grand Rapids Cutter Grinder
No. 62 Power Feed Model



The boss knows a soft touch when he sees one. He's been around the toolroom long enough to know that Grand Rapids Cutter Grinders are famous for unusually fast and convenient set-ups. Like toolroom experts everywhere, he knows, too, that Grand Rapids Cutter Grinders are unmatched for precision sharpening, fast, easy operation and minimum maintenance.

Model 62 has four-speed spindle drive, fully guarded ball bearing ways, more vertical capacity and exceptionally long swing. One-shot lubrication system cuts maintenance time.

Take a tip from the boss . . . choose Grand Rapids Cutter Grinders for fast, easy, *precision* toolroom grinding.



GALLMEYER & LIVINGSTON COMPANY

408 Straight Ave., Grand Rapids, Mich.

Please send me literature on the complete line of Grand Rapids Cutter Grinders:

Name _____

Firm _____

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City _____

State _____



allowing ourselves to forget the critical level of productive capacity to which we permitted our industrial plants to drop prior to World War II and then once again prior to the Korean conflict.

The latest reminder that America's current machine tool resources are falling behind mobilization production needs in the event of a national emergency comes from James C. Kelley, General Manager of the American Machine Tool Distributors' Association. Speaking recently before a subcommittee of the U.S. Senate Small Business Committee, Mr. Kelley warned that since the close of hostilities in Korea the total machine tool inventories in the country have failed to keep pace with technological advances and many of them have become obsolete.

In his statement, Mr. Kelley reported that prior to the Korean war, only about 43 per cent of all machine tools owned by private industry were 10 or more years old. Today, the fig-

ure is about 55 per cent, and in addition, nearly one-fifth are more than 20 years old. He noted that government-held active and reserve machine tools are a little better. He reminded the Committee that during World War II and the conflict in Korea, the machine tool industry was required to replace large quantities of outmoded government machines while providing additional capacity and reconversion of plants to military production. He warned that this situation is likely to recur in the event of a new emergency unless effective measures are taken now to avoid past errors.

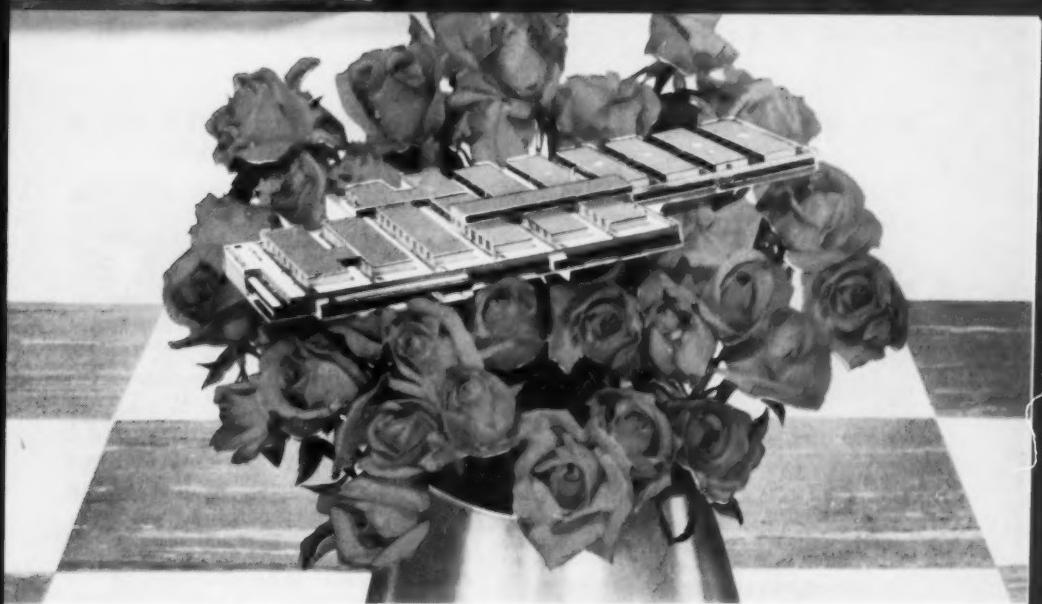
In addition to the need for a dynamic modernization program, Mr. Kelley outlined the following recommendations to overcome the lag in machine-tool defense needs:

1. Special concentration on production capacity during the next few years, beginning with existing programs, such as the elephant tool reserve, turbine and turbine gear programs.
2. Budgeting for production capacity should be given an extremely high priority so that there will be ample appropriations which can be translated into actual expenditures.

By conservative estimate, it costs the nation at least a billion dollars per year to retain obsolete machines in its metalworking industries. This is the time for every reader of this magazine to ask himself the question, "How much am I contributing to this enormous loss?" Individually and as a nation we have a responsibility to reduce wasteful expenditures and to strengthen our productive capacity as well.



J. C. Kelley, General Manager, A.M.T.D.A.



Want to put your plant on a bed of roses?

You can—easily! Switch to CIMCOOL[®], the radically new and different cutting fluid. Here are just three of many reasons why CIMCOOL Concentrate gets all the bouquets:

- **CIMCOOL LOWERS COSTS** because it's longer lasting in machines. Thus, it reduces downtime and cuts labor costs for cleaning and changing.
- **CIMCOOL INCREASES TOOL LIFE** because of its chemical lubricity. It permits faster speeds and feeds, for it combines friction reduction and cooling capacity in a degree never before attained.
- **CIMCOOL IS CLEAN**, doesn't soil clothing or hands. It contains no skin irritants, leaves no slippery film. Can't smoke, burn, and virtually eliminates rancidity.

Let us give you the full details on CIMCOOL Standard Concentrate—and on the entire family of CIMCOOL Cutting Fluids. Wire, write or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Company, Cincinnati 9, Ohio.

CIMCOOL CUTTING FLUIDS

*Trade Mark Reg. U.S. Pat. Off.

CIMCOOL Concentrate—The famous pink fluid which still covers 85% of all metal cutting jobs. Effective, economical and clean.

CIMCOOL Tapping Compound—Permits the use of highest tapping speeds and increases tap life amazingly.

CIMPLUS—The transparent grinding fluid with exceptional rust control. Also used for machining cast iron and as a water conditioner with CIMCOOL Concentrate.

CIMCUT Base Additive—For jobs requiring an oil-base cutting fluid. Added to mineral oils, it gives an economical mix for higher speeds and feeds.

CIMCOOL Bactericide—The most effective agent yet developed to overcome rancidity and foul odors.

CIMCOOL Machine Cleaner—The two-phase non-corrosive cleaner that removes grit, dirt, slime and oil.

CIMCOOL

Cutting Fluids

for 100% of all metal cutting jobs

PRODUCTION-PROVED PRODUCTS OF THE CINCINNATI MILLING MACHINE CO.

OVER THE EDITOR'S DESK . . .



Letters to the Editor:

CLAMPING

Please send me two copies of reprint "Clamping on the Tangent" which appeared on Pages 106 through 107 of the January, 1956 issue of Modern Machine Shop.

E. T. Dworzak, Product Designer
Skil Corporation
Chicago 30, Illinois

EXPORT

We wish to contact firms in the U.S.A. interested in exporting special machine tools for automation production in Australia.

We would be pleased if you would acquaint interested manufacturers of our wish to establish business relations as indicated, suggesting that they communicate directly with us, with a view to establishing a mutual business interest.

Guido Le Grazie, Managing Director
Karuma Research and Development
Laboratories
56 Silverwater Road,
Auburn, N. S. W.
Australia

LAPPING TOOLS

Could you advise us as to a source of supply for lapping tools? These tools are to be used in lapping out bore through extrusion dies on vinyl plastics. We would like a supply

ranging in size from .090 to .375, to use in $\frac{1}{4}$ inch electric drill.

M. Sutherland, Secy.
Olsen Company, Inc.
Sarasota, Florida

TORQUE SCREW DRIVER

I have been receiving copies of Modern Machine Shop for several years and find it up-to-date with plenty of "know-how." We are in need of a torque screw driver and I thought possibly you may lead me to a supplier or manufacturer of such a product.

G. A. Kumpf, Broadcasting Engineering Section
Radio Corporation of America
Camden, New Jersey

HOW GOOD A BOSS

It would be appreciated if five copies of "How Good a Boss Are You?" by Alfred M. Cooper were sent to the writer. Cooper's system for rough checking certainly has its merits.

W. H. Naylor, Assistant Superintendent
Link Aviation, Inc.
Binghamton, N. Y.

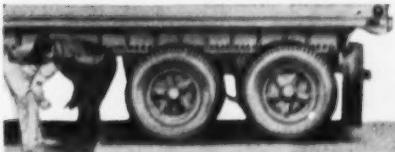
Would you please send six copies of the article "How Good a Boss Are You?" to the attention of the writer?

A. J. Schubert, Assistant Superintendent
Lockheed Aircraft Corporation
Burbank, California

We would appreciate your sending us 25 copies of the article entitled "How Good a Boss Are You?" by Alfred M. Cooper.

E. L. Dreyer
Adamas Carbide Corporation
Kenilworth, New Jersey

Wrought Everdur® Cuts Cost in Half



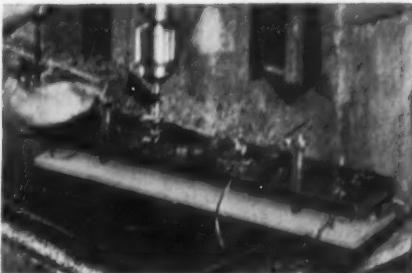
THE TRAILMOBILE SHIFTABLE TANDEM—Truckers often lose time and money in shifting trailer cargo, changing tractors, or cutting pay-load to meet legal axle-weight requirements. Now, however, they can balance any load in just five minutes by moving the Shiftable Tandem Axle Assembly made by Trailmobile Inc., Cincinnati, Ohio. The axle assembly slides forward or backward, as needed, along a stainless steel rail on four shoes of wrought Everdur. It can move 66 inches and be locked at 3-inch intervals by locking rods through holes in the rail.



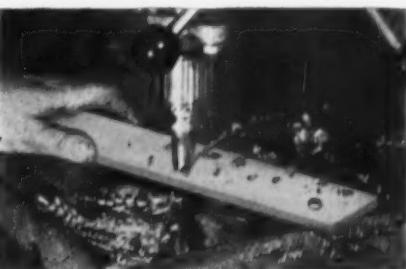
EVERDUR CAN TAKE THE LOADS AND SPLASH—One of the shoes of wrought Everdur installed in the Shiftable Tandem frame. An Alemite fitting in center hole and oil grooves provide lubrication. The Everdur shoes carry normal tandem loads of 32,000 pounds day and night, and slide freely under this pressure. Resistance to corrosion is another reason why Everdur was selected, for unlike the trailer's cargo, the Everdur shoes are exposed to road splash of varied mixtures.

Wherever metal must resist corrosion, be strong and tough, and be available in forms easily fabricated, consider Everdur, Anaconda's family of copper-silicon alloys. The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

Reg. U. S. Pat. Off. 468



HOW WROUGHT EVERDUR CUT MATERIAL COSTS—Trailmobile first tried high-tin bronze castings for the shoes on which the assembly slides. But rejects for porosity and warpage in the thin cast section were a costly problem—and all surfaces had to be finish-machined. The wrought Everdur bar stock suggested by Anaconda's technical experts has surfaces satisfactory as delivered—ready for drilling holes (shown above).



HOW WROUGHT EVERDUR CUT LABOR COSTS—The castings formerly used were not uniform. Hard spots made surface machining difficult and expensive. The entire operation was unnecessary with wrought Everdur bar stock—reducing labor cost by about 50 per cent. (Above) Countersinking holes for screw fastenings.



WROUGHT EVERDUR IS READILY MACHINABLE—Though tough and dense, wrought Everdur is uniform and poses no special problems in machining. Oil grooves are shown being milled in the shoes.

EVERDUR

ANACONDA® COPPER-SILICON ALLOYS

For more data circle 295 on Reader Service Card



Please forward to us six copies of your article "How Good a Boss Are You?"

L. McGuarrie, Plant Supt.
The Bristol Spring Mfg. Co.
Plainville, Connecticut

I would appreciate your sending to me three copies of the article "How Good a Boss Are You?" by Alfred M. Cooper.

F. Spagnoli, Assistant to Master Mechanic
American Can Company
Brooklyn, New York

I am interested in obtaining three copies of your article "How Good a Boss Are You?" which appeared in *Modern Machine Shop*.

V. DiBona, Tool Design
Piasecki Helicopter Corp.
Morton, Pa.

WELDED STEEL TUBING

In the January issue of *Metals Review*, reference was made to an article appearing in *Modern Machine Shop*. This information would be of value to us. Please send me two copies of "How to Fabricate Welded Steel Tubing" by W. E. McFee, from the December issue.

David Fagan
Jones Lithographing Co.
Dalton, Illinois

MAY WE?

In supplying information on a wide variety of technical and engineering subjects to the personnel of our company, it occasionally happens that it would be desirable to employ photostatic copies of certain

articles or excerpts for this purpose. This is especially true where the literature in question is not current.

Except in a few instances, one copy would be quite sufficient, and never more than two or three copies would be made when more than one organization is interested in the subject matter.

Inasmuch as such material is usually copyrighted, your permission to photostat occasional articles appearing in *Modern Machine Shop* under the conditions outlined above would be greatly appreciated.

T. W. Ragan, Engineering Services
Western Electric Company
Indianapolis Works

• We are pleased to grant permission requested. Would appreciate receiving copy of reproduced material for our files.—Ed.

NEW SUPERVISOR

Will you please send us six reprints of the article which appeared in the December 1955 issue entitled "The Brand New Supervisor?"

J. P. Brew
Central Screw Company
Keene, New Hampshire

May we have your kind permission to reprint approximately 1800 words of Alfred M. Cooper's "The Brand New Supervisor" which appeared in *Modern Machine Shop* for December 1955?

Both your publication and the author will be fully credited, and we will gladly send you marked file copies of our Supervisor's Memos & Quotes in which the reprint appears.

Mort Friedlander, Editor
Executives' Service, Inc.
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OVER THE EDITOR'S DESK . . .



OXIDE BASE CUTTING TOOLS

With reference to the article appearing in the February issue of *Modern Machine Shop*, please forward all available literature along with price list on Ceramic Cutting Tools. Also please advise availability and delivery.

J. N. Minahan, Buyer
General Electric Company
Aircraft Products Department
Burlington, Vermont

In the February 1956 issue of *Modern Machine Shop*, there appeared an article entitled "Oxide Base Cutting Tools." On page 114, first paragraph of this article, the names of the following articles were mentioned: The Stupakoff Division of Carborundum Company and Diamonite Products Division of the U. S. Ceramic Tile Company. We are particularly interested in the possibilities of these oxide base cutting tools and would like to obtain complete information from the above companies.

W. C. Lewandoski, Tool Engineering
Rockwell Manufacturing Company
Barberton, Ohio

Please advise address of Diamonite Products Division of the U. S. Ceramic Tile Company.

Hobart Brothers Company
Troy, Ohio

In the February issue of *Modern Machine Shop*, there was an article

on Oxide Base Cutting Tools. We would appreciate having you send us a Diamonite Cutting Tool catalogue or handbook on ceramic cutting tools.

R. S. Conder, Purchasing Agent
Perfect Circle Corporation
Hagerstown, Indiana

An article on Oxide Base Cutting materials appears in the February 1956 issue, page 114. We desire to try some of these materials. Please send us the names and addresses of the companies that are mentioned in the article.

Alex Muenzer, Superintendent
Harrison & Harrison Engineers
Hollywood, California

Will you kindly advise address of Diamonite Products Division of U. S. Ceramic Tile Company.

John Hubeny, Works Manager
Hubeny Brothers, Inc.
Roselle, New Jersey

Please send us information about the new Oxide Base Cutting Tools.

D. L. Cunningham, Chief Tool Designer
Sundstrand Machine Tool Company
Rockford, Illinois

• Companies mentioned in the article and their addresses—

Carboloy Department, General Electric Co., 11143 East Eight Mile Rd., Detroit 32, Mich.

Diamonite Products Div., U. S. Ceramic Tile Co., 217 Fourth Street, Canton 2, Ohio.

Norton Company, Worcester 6, Mass.

Stupakoff Division, Carborundum Company, Niagara Falls, N. Y.—Ed.



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Simplicity and Strength
based on these superior features:

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A slight turn of a single screw permits rapid indexing of the ARMIDE insert — reducing down time to a minimum.

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ARMSTRONG ARMIDE Carbide Insert Tool Holders are furnished in two styles and three sizes. Complete data on these tools is given in Bulletin CIT, mailed on request.

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April, 1956



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modern machine shop 101

FEATURES IN T

PRODUCTION WITH SAFETY IN PUNCH PRESS OPERATIONS

By **Dan F. Brady**

The amazing results achieved in a punch press safety program at The Maytag Company, Newton, Iowa, are revealed herewith in words and pictures by the manager of safety at this company. Page 104.



APRIL
1956

SHAVING AUTOMOTIVE GEARS

In a large automotive plant gears are being finished at the rate of 260 per hour on an automated underpass gear shaving machine, built by the Michigan Tool Company, Detroit, Michigan. Page 116.

HOW TO SELECT STEELS FOR BEST MACHINABILITY

By **Howard E. Boyer**

The discussion is confined to the machining properties of steel and how to achieve better machining characteristics by the route of material selection. Page 118.

SHAPING INTEGRAL KEYS

By **F. E. Riley**

This article illustrates and describes a carbide tooling setup which is used in cutting integral keys on cored bronze stock. Page 126.

SURFACE GRINDING V-BLOCKS OF MEEHANITE IRON

By **John E. Hyler**

Machine Products Corporation, Detroit, Michigan, utilizes a heavy-duty horizontal spindle surface grinder to machine Meehanite V-blocks to a tolerance of 0.0005 inch. Page 130.

N THIS ISSUE

METROLOGY LABORATORY—ONE OF WORLD'S UNIQUE WONDERS

By Fred W. Vogel

The Eli Whitney Metrology Laboratory, newly established at Dayton, Ohio, on the premises of The Sheffield Corporation plant, is equipped to provide modern industry with precise standard measurement certified to an accuracy of one-millionth of an inch. Page 132.

THROW-AWAY TOOL BLANKS SPEED MACHINING OF JET ENGINE PARTS

By L. B. Lorain

A 150 per cent production increase of parts going into jet engines has been reported by Solar Aircraft Company, San Diego, California, through the use of a new tooling technique. Page 136.

REMOVING DISCOLORATION FROM STAINLESS STEEL WELD AREAS

By W. E. McFee

This how-to-do-it article tells what type of electrolyte, electrode and power source to use in removing heat discoloration from areas adjacent to welds. Supplementing the text are several illustrations showing equipment and procedures for performing this particular operation. Page 138.

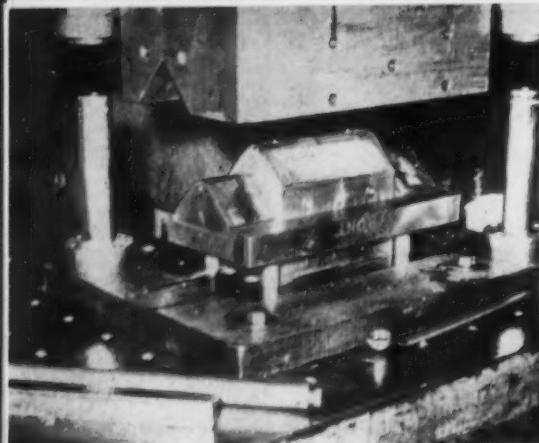
HOW TO GET THE MOST FROM CUT-OFF MACHINES

Based on studies conducted by the Delta Power Tool Division of Rockwell Manufacturing Company, recommendations for cutting off ferrous and non-ferrous metals with abrasive cut-off machines are given in this article. Page 142.

VOL. 28

NO. 11





Innocent looking and yet a symbol of tragedy—in the die set shown here, an operator lost his left hand. Proper and adequate guarding, as shown in other illustrations throughout this article, could have prevented this tragedy.

Production with

By DAN F. BRADY

Manager of Safety,
The Maytag Company

In order to achieve satisfactory results in a safety program, it is essential to first obtain the full co-operation and financial support of management. Further, if you yourself are not qualified, secure the services of a design engineer, one who, through his experience, has considerable knowledge of dies and presses. You will, no doubt, have such an employee working in your own company. If such an engineer is not available, your insurance company, if you have a private carrier, will have engineers who, in nearly all cases, are very well qualified to assist you in establishing a safety program.

We at the Maytag Company were fortunate. We had management behind us, the design engineer and an engineer from our insurance company, plus the full cooperation of the tool makers, line foremen and employees. The results of our efforts to achieve safer working conditions are

vividly shown in the illustrations on this and following pages. When viewing these examples, it should be borne in mind that safe working conditions can only be achieved through constant study of the operations involved.

On many jobs at Maytag we have increased production by as much as 300 per cent by adapting safer feeds, ejections and barriers to the jobs. Our accident experience in 1950, when we first started work on the program, consisted of 79 lost-time accidents, 38 of them amputations and many multiple amputations. We had a total of 14,069 days charged time with a severity rate of 1.86 and a frequency rate of 10.46. After five years of operation with our particular guarding program, we at Maytag had a total of eight lost-time accidents in 1955, giving us a frequency of 1.14 and severity rate of 0.19.

We are now operating approxi-

The amazing results achieved in a punch press safety program at The Maytag Company are revealed herewith in words and pictures.

SAFETY in Punch Press Operations

mately 100 presses, and our press department is operating, at the present time, on a record of 1,300,000 man-hours without a disabling injury. I

am sure that this outstanding type of record proves that production with safety is not an idle saying, but can be and is an accomplished fact.



Fig. 1—The two men shown here were responsible for setting up the Press Guarding Program illustrated on this and following pages. The man on the right in the illustration above is the supervising engineer of an insurance company while the man on the left is Safety Manager for the Maytag Company and likewise the author of this article.

Production with SAFETY in Punch Press Operations

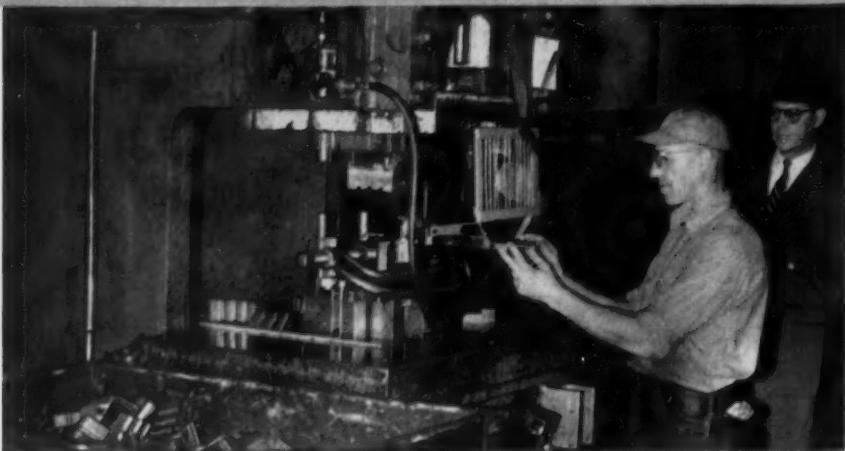


Fig. 2—This illustration shows the insurance company engineer witnessing the testing of a slide feed device that has been installed on a forming die used in the Maytag plant.



Fig. 3—In this view, the insurance company engineer observes the demonstration of long stroke or constant pressure control buttons on a large hydraulic type draw press.

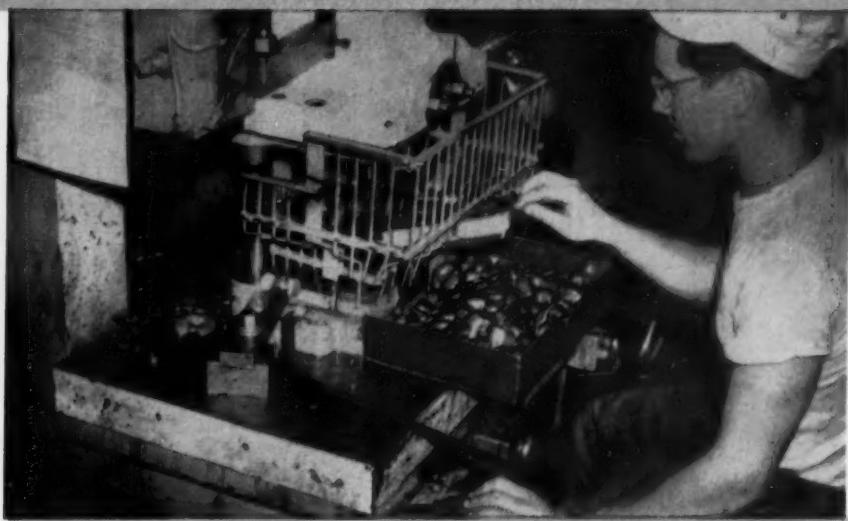


Fig. 4—This is an example of an inclined chute feed with air ejection permitting complete guard enclosure of die and allowing one button control, leaving one hand free

to supply parts in the feed chute. Prior to the design and installation of this chute, parts were placed under the die by hand and removed by means of the long method.

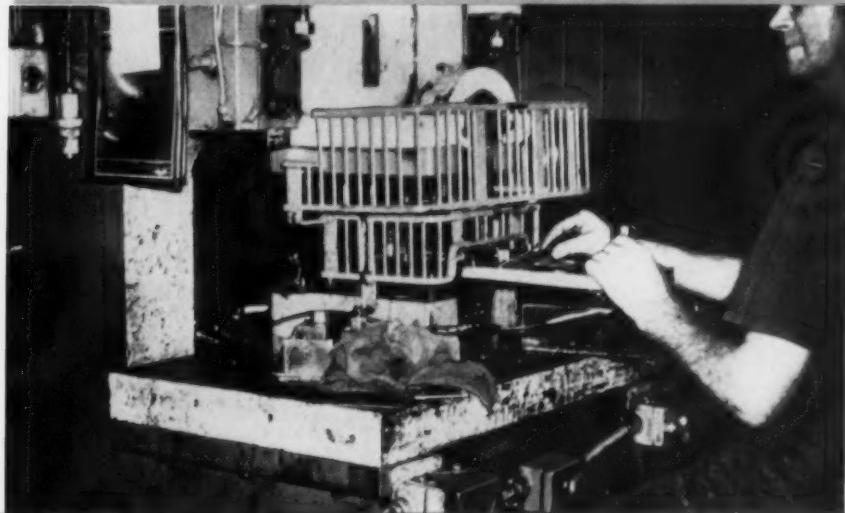


Fig. 5—Shuttle feed design with air ejection which permits full die enclosure and allows one button control, thus leaving one hand of the operator free to ready the next workpiece.

Production with SAFETY in Punch Press Operations

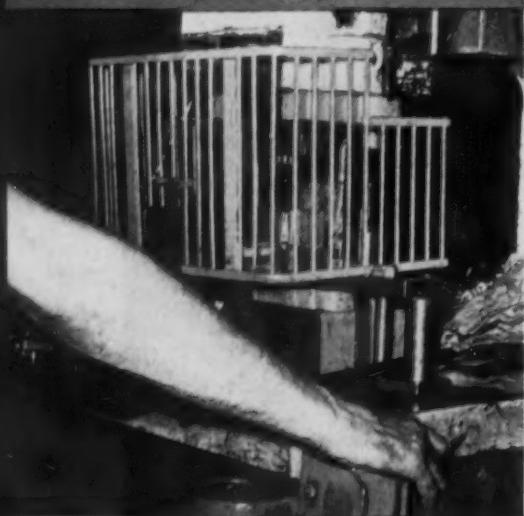


Fig. 6—A good example of a die enclosure showing the guard extending above the ram in open position. Die is equipped with an inclined chute with air ejection feature.

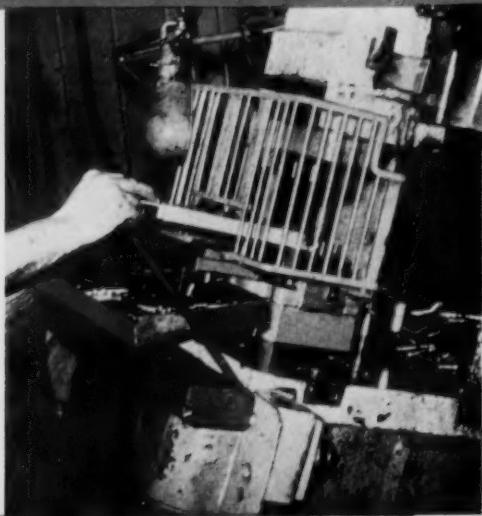


Fig. 7—Shown is a progressive slide feed where one part pushes the forward part into position; then finished part is ejected by air, thereby making ready for next part.

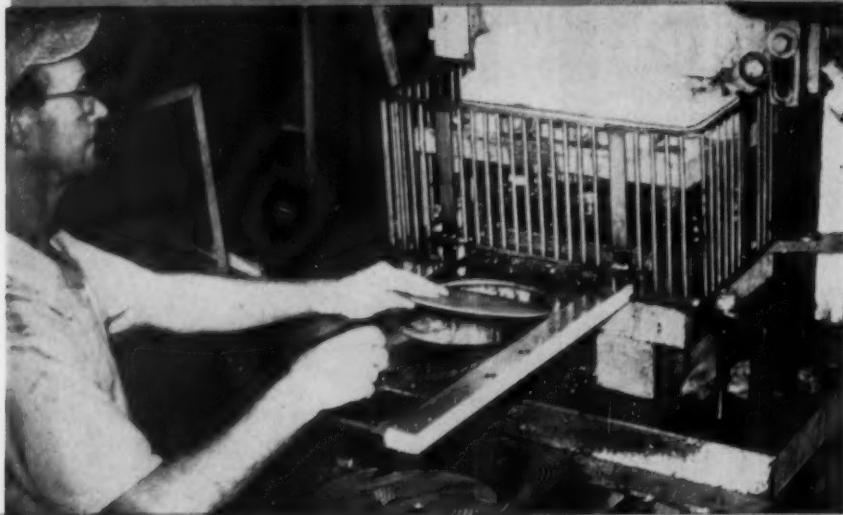


Fig. 8—Here is shown a method of loading the shuttle feed while it is in the "out" position. The guard extends above the ram of the press, thereby eliminating any shear points.

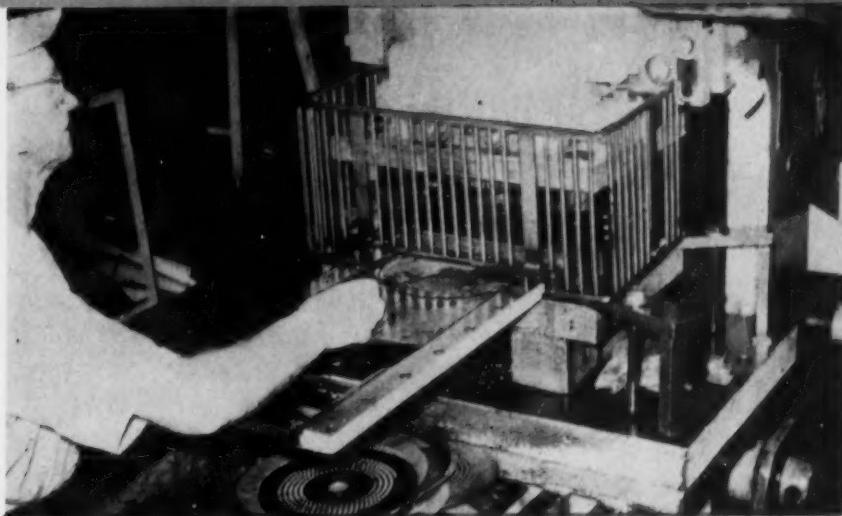


Fig. 9—This illustration shows the same shuttle feed, as that illustrated in Fig. 8, part way out. All presses are equipped with safety switches so as to provide positive location of the work before each of the presses can be activated by the operator.

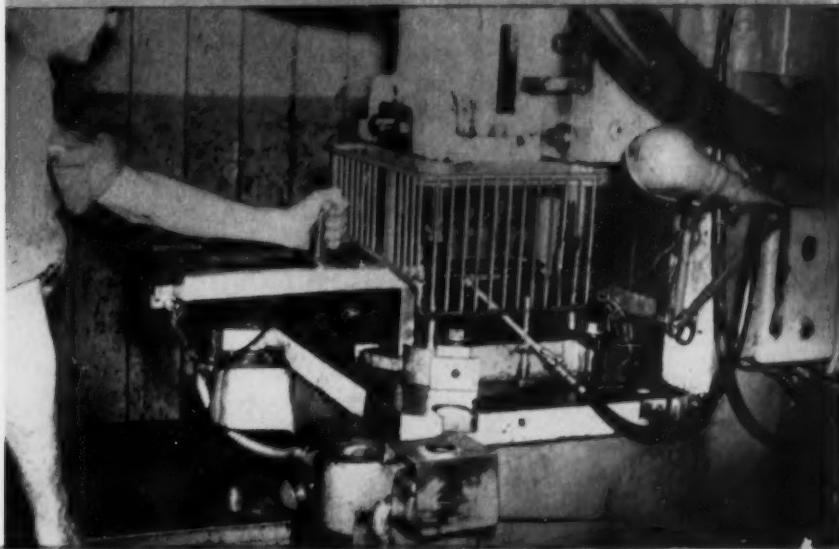


Fig. 10—This illustration shows an example of a shuttle feed in the "in" position. This view also shows the air ejection nozzle which provides for safe removal of the parts produced.

Production with SAFETY in Punch Press Operations

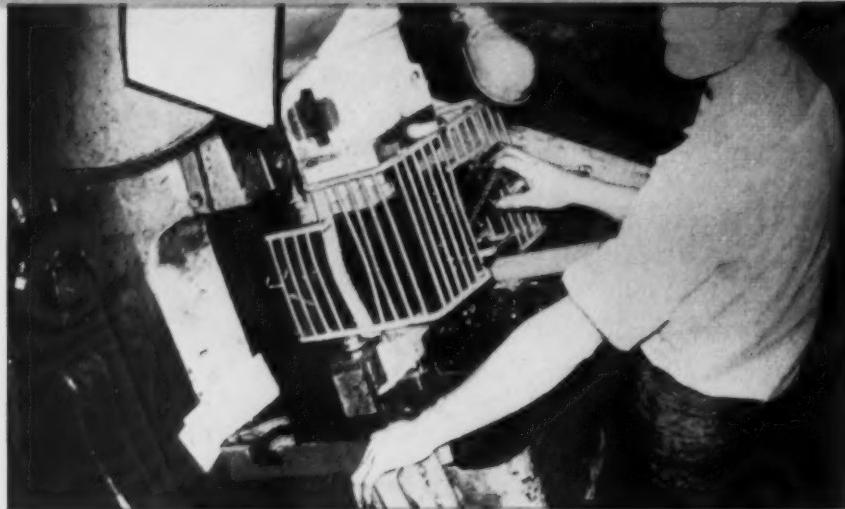


Fig. 11—Here is an inclined chute feed magazine and air ejection setup with a one button control, allowing the free hand

to supply parts to the magazine at all times. This particular setup also increased output approximately 300 per cent.

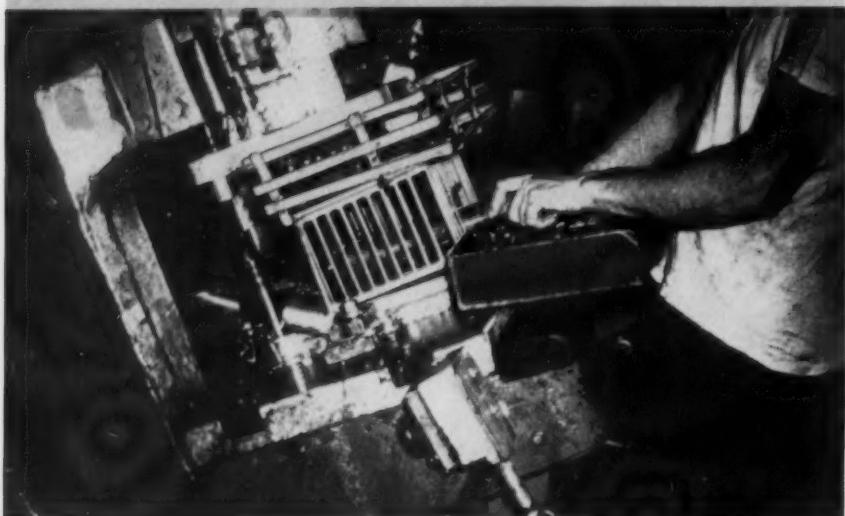


Fig. 12—Here is shown a forming operation with the stock fed over a mandrel down to the die which pushes the forward part into

position to be formed to the shape desired while pushing the finished part out of the back of the die and into an inclined chute.

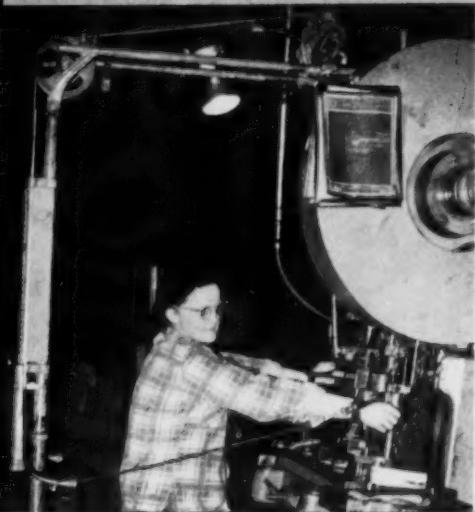


Fig. 13—Illustration showing operator testing the pull-back guard of a punch press for correct distance to assure maximum safety.

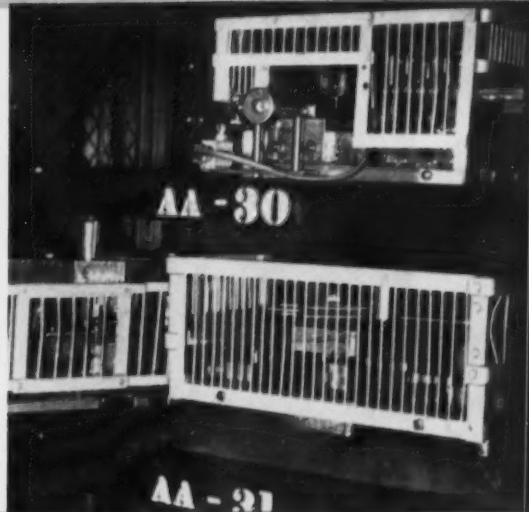


Fig. 15—This illustration shows that guards remain with dies even when in the tool crib. Top die is provided with manual knock-out.

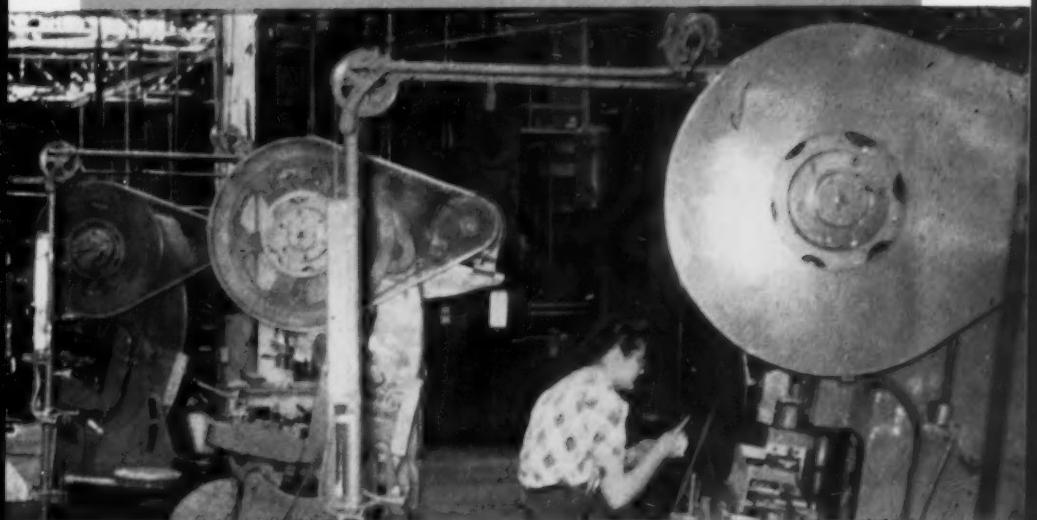


Fig. 14—This illustration shows a line of small punch presses equipped with the pull-back guards. Also note the adequate clear-

ance that is provided between the presses in the line, thus insuring good traffic flow and eliminating congestion as well.

Production with SAFETY in Punch Press Operations



Fig. 16—In this view the insurance company engineer is shown in the process of testing the mechanical knock-out installed on the forming die which is illustrated in Fig. 15.

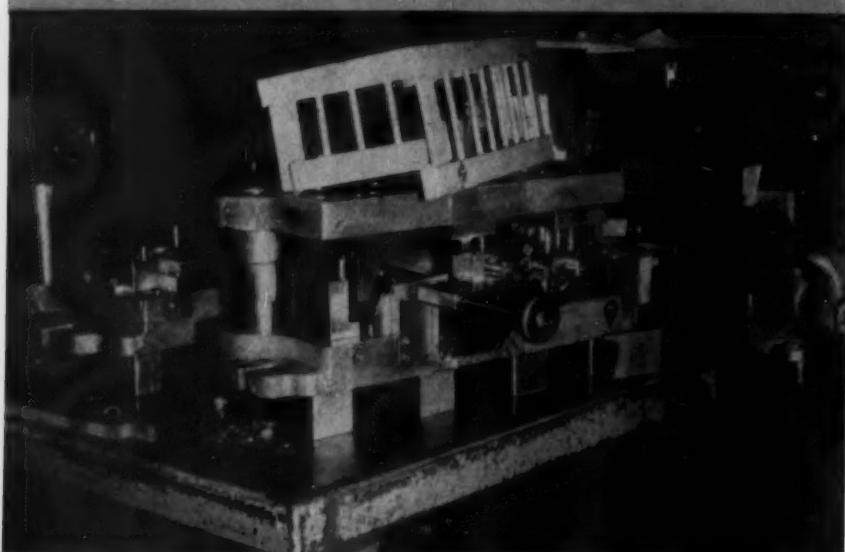


Fig. 17—This illustration shows a die in the repair crib and the guard shown is for this particular die—further proof that the safety guard always remains with its intended die.



Fig. 18—Here is illustrated a typical example of multiple-button operation on a mechanical press. Both hands are used to press buttons before press will cycle. These are long stroke or constant pressure buttons.

You can see one of the operators through the opening between the ram and die of the press. This particular operator also has to hold two buttons compressed before the ram will cycle to assure safety of operators.

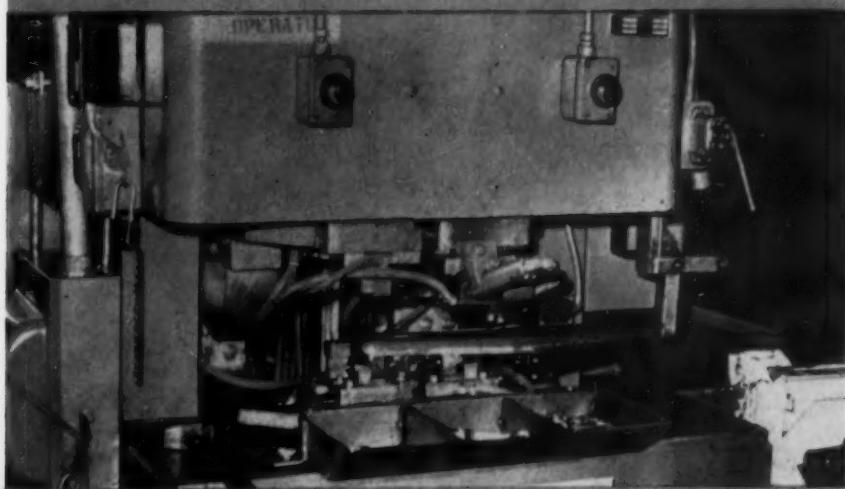


Fig. 19—Close-up view of a progressive welder showing the convenient, yet safe, operating position of the multiple buttons which are used to control the machine's function.

Production with SAFETY in Punch Press Operations

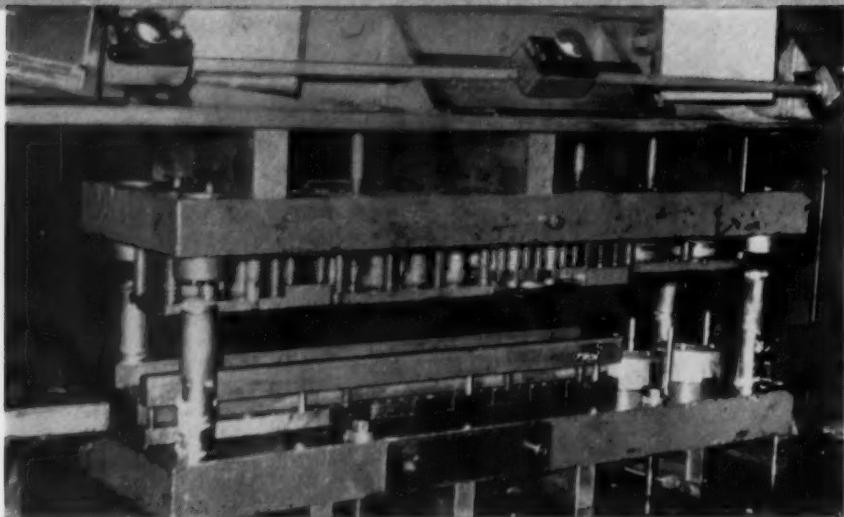


Fig. 20—This particular illustration shows the safe operating location of the control buttons used in conjunction with a large progressive die which is installed in a punch press.

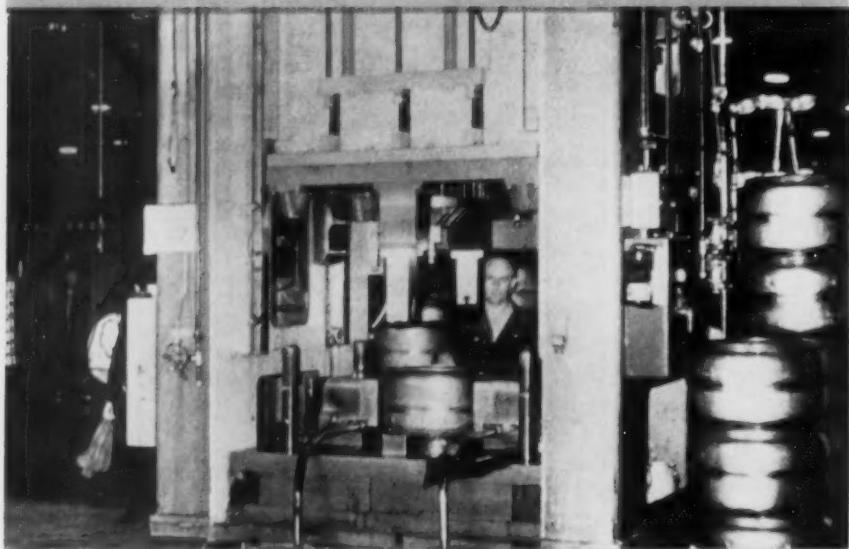


Fig. 21—This illustration shows a view of a piercing die operation in which the rear guides of the press are left unguarded, thereby creating a readily obvious operating hazard.

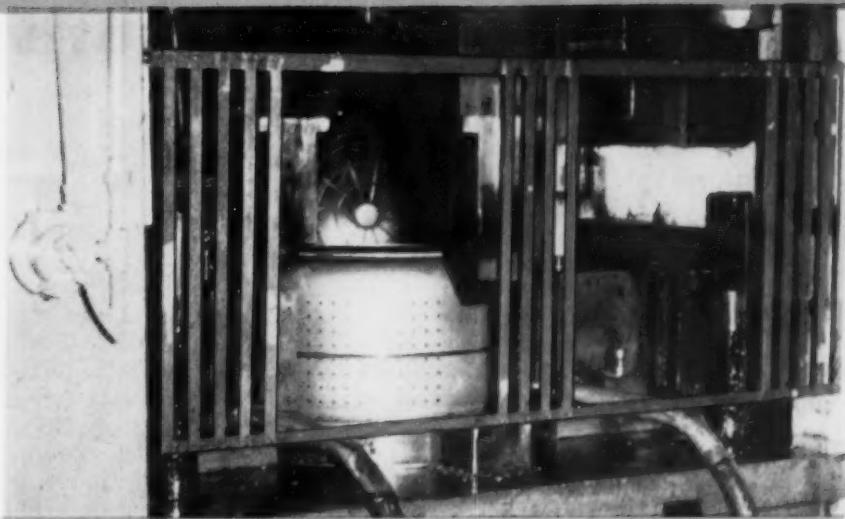


Fig. 22—Here is another view of the same piercing die operations as that shown in Fig. 21; however, in this instance guides of the press are properly guarded for operator safety.

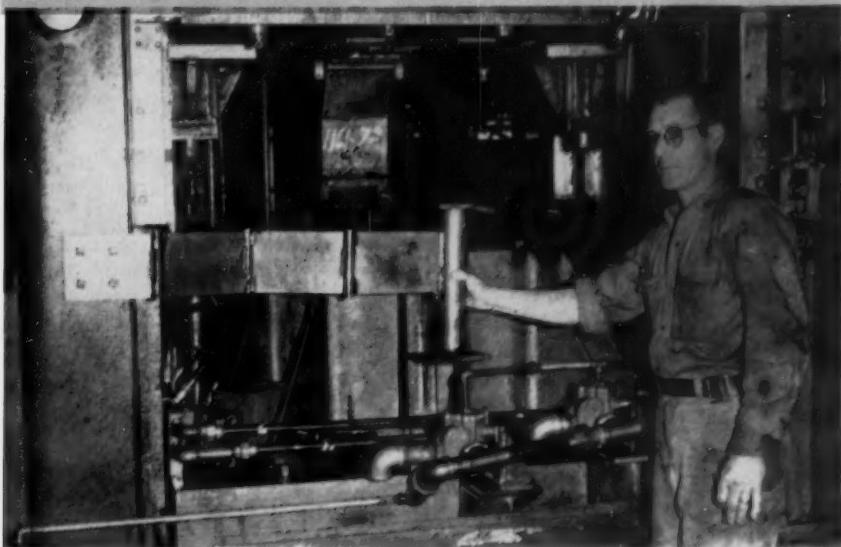


Fig. 23—Here the setup man is shown pulling out the hinged mounted die block that is inserted between the die sections when it becomes necessary to wipe and re-oil the dies.

SHAVING Automotive

**Automated underpass gear finisher shaves
260 pinions per hour.**

A "Gear-O-Mation" equipped underpass gear shaving machine is finishing gears automatically in a large automotive plant at the rate of 260 per hour. The entire gear shaving setup, built by Michigan Tool Company, Detroit, Michigan, consists of an underpass gear shaver equipped with vibrating hopper feed, automatic loading arrangement, three-way probe-type gear classifier and control panel.

In addition to controlling the operation of the machine, the control panel counts correct size gears and keeps track of oversize and undersize gears on both a percentage of production and total count basis. A feedback system actuated by the gear classifier through the control panel automatically corrects center distance when gears are undersize or oversize. If this condition persists, the machine shuts down automatically for the required corrections.

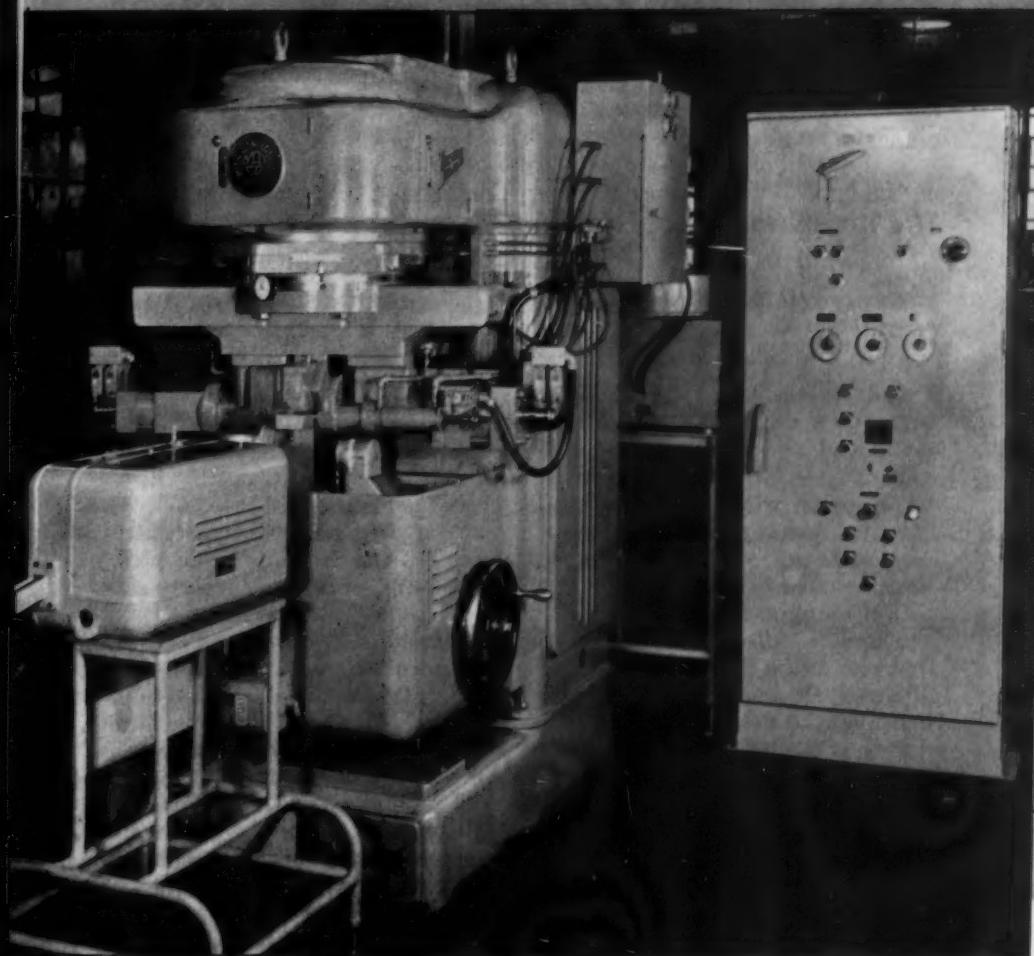
Stock over pins removed in the shaving operation is 0.004 to 0.006 inch. The 18-tooth pinion with a $1\frac{1}{2}$ normal pitch has a left-hand helix angle of 22 degrees 11 minutes 30 seconds, face width of $1\frac{1}{8}$ inches, and o.d. of 1.1419 inches. Bore di-

ameter is 0.6876 to 0.6881 inch.

The outside diameter of each stub arbor is held within 0.6873 to 0.6875 inch to provide a light press fit between gear bore and stub arbors when the gear is being shaved. The pneumatic cylinder which operates the headstock center is 6 inches in diameter, while the tailstock cylinder is 4 inches in diameter. When the gear is loaded, the headstock center, powered by the larger cylinder, bottoms against a stop when its stub arbor enters the bore of the gear. The smaller tailstock cylinder does not bottom, but exerts full pressure on the headstock stub arbor. Both stub arbors are instantaneously withdrawn after the gear is shaved. This setup makes possible consistent accuracy of the shaved gears.

After the gears are shaved, they pass through a chute to the three-way gear selector, with correct size gears passing straight through. Any undersize or oversize gears are diverted, with the control panel counting each one. This quality control setup with the feedback system checks every shaved gear for size and provides maximum assurance that every gear will be within tolerances.

GEARS



Michigan underpass gear shaver, completely "Gear-O-Motion" equipped, finishes automotive pinions at 260 per hour. Stub arbors on headstock and tailstock are air operated.

HOW TO SELECT STEELS FOR BEST MACHINABILITY

By HOWARD E. BOYER



The discussion is confined to the machining properties of steel and how to achieve better machining characteristics by the route of material selection.

Manufacturers of metal products are naturally striving for the same goal as any other manufacturer; that is, attempting to provide the customer with the highest quality at the lowest manufacturing cost. Any increases or decreases in cost are subsequently reflected in the final cost of the product to the consumer.

There is little doubt of the fact that one of the most lucrative fields of attack in the war of cost reduction, within the metalworking industry, is that of decreasing machining costs. The subject of shaping metal parts by machining is one which covers a large territory so that a discussion of only one phase shall be attempted within the scope of this treatise. In the first place the discussion shall be confined to the machining properties of steel, which metal is and will continue to constitute a major percentage of the total amount

of metal machined in our factories. Furthermore, this treatise shall be confined mainly to achieving better machining characteristics by the route of material selection; not dwelling extensively upon cutting fluids, cutting tools or other phases of the subject all of which are separate studies.

Nearly everyone even remotely concerned with machine shop operations is at least vaguely familiar with the term "free machining steels." This term, like many other such terms, had a fairly definite and well understood meaning at one time, but with continued development in the steel industry it has now been rendered wholly inadequate as a descriptive term. Obviously a so-called free machining stainless could not be machined with the same degree of ease compared to a high sulphur Bessemer grade of steel which was

probably the one originally termed as free cutting steel. Therefore, when a steel is said to be free machining one may rightfully ask, "how free"? If one has a fair understanding of steel compositions the term may have a more specific meaning if the comparison is properly made. For example, consider the well known Type 410 stainless as a basic material and one which is equally well known for its inability to machine readily. Type 416 is essentially the same steel relative to composition excepting one constituent or in some cases more than one which is added solely for the purpose of providing improved machinery characteristics. Thus, one might say that Type 416 is a free machining steel, but only when compared to Type 410 or some similar steel.

How are these machining characteristics imparted to steels? Are they obtained at the sacrifice of mechanical properties? If so, how much machinability can be gained without loss of quality? How do free machining additives affect heat treating characteristics? Do free machining steels cost more? How about finishes on the free cutting grades? Do free machining additives offer a health hazard in machine shops? It is the hope of the author that these questions and others will be at least partially answered in the following paragraphs of this article.

In order to fully comprehend answers to the foregoing questions it is first necessary to understand the simple mechanics involved in metal cutting which will, in turn, aid the reader to understand how the so-called free cutting additives provide

improved machinability. Figure 1 will help to illustrate just what takes place as a tool removes metal from the workpiece. Contrary to many common assumptions the tool does not split the material from the workpiece as though an ax were splitting wood or other fibrous material. Instead, as the work comes in contact with the tool point the chip is removed by compressive force, thus causing the alternate compression and rupture shown in the sketch of the chip. This enlarged view illustrates the type of chip formed from a relatively brittle material. It will be noted that the point of the cutting tool in Fig. 1 is free from a built-up edge which serves as a curse in any machining operations. In other words the condition shown in Fig. 1 represents one which is nearly ideal from the standpoint of easy machin-

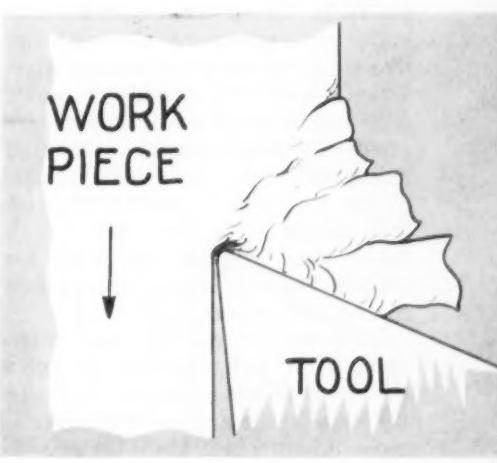


Fig. 1—Cross-section of tool and steel work-piece shows how chip is removed by compression and rupture. Brittle chips like those shown in this sketch are removed with little tendency for a built-up edge to form on the tool.

"Any materials which provide brittle chip are generally more desirable for machining."

ing, good finish and long tool life. Any materials which provide the brittle type of chip illustrated in Fig. 1 are generally more desirable for machining.

Figure 2 is another sketch showing a similar tool removing a chip from the workpiece. It will be noted that the principle of alternate compression and rupture has not changed, but in this case the steel is evidently more ductile, thus it does not rupture completely, as shown. Also the chip has tended to adhere to the tool point allowing the well known built-up edge to form (dark area). Trying to cut any steels under such conditions poses a difficult situation. It might be considered analogous to cutting meat with a sharp knife, but with some soft material like cloth covering the cutting edge. When steels are machined under such conditions the results are: (1) greatly increased pressure at the tool point will cause premature failure of the tool with a general slow up and added difficulty; and (2) a badly torn finish on the work, for usually the edge builds up and then passes away alternately.

In order to correct any difficulty it is first necessary to know the cause. What promotes the built-up edge which anyone will agree is most undesirable? Built-up edge is a form of pressure welding. Some combinations of steel surfaces have a greater affinity for each other compared to certain other combinations. In general the more ductile steels are

said to be more "sticky" which means that they have greater tendency to adhere to the tool under conditions of high pressure and will weld solidly to the tip of the tool. Once the welding is nucleated, difficulty mounts upward at a rapid rate. As cutting proceeds with the built-up edge, the pressure rises and promotes more complete welding while the temperature then reaches abnormal values, all of which adds up to failure.

Now that the basic cause for the difficulty is known how can it be overcome? Naturally a complete answer to this question would be a large order for it is agreed among many who have studied such conditions that theoretically it would be possible to machine some steels with a resulting mirror finish if adherence of the work to the tool could be completely prevented. On a practical basis some pressure welding of the workpiece cannot be prevented, but it can be minimized by well directed efforts from three different directions. First the tools must be considered carefully, secondly the cutting fluid must also be given consideration and third the composition of the material being machined must be considered. If high speed or other high alloy tools are employed there are several surface treatments including nitriding, chromium plating and oxide coatings which will serve to decrease the tendency for the chip to weld to the tool. The relative merit of these treatments is controversial

and shall not be discussed further in this treatise. It is mentioned merely to emphasize the importance of this attribute.

It is not the intention to discuss the cutting fluids at any length, but this phase is also highly important. It will be noted that the author chooses to term them as cutting fluids rather than lubricants or coolants. The reason for this is that the term coolant is inadequate and the term lubricant might also be questioned when the role of cutting fluids is fully considered. There is no question of the fact that cutting fluids do serve as coolants.

In many cases of high speed machining, tools and work together would virtually burn up if the temperature were not kept at some reasonable level. Therefore, the flow of cutting fluid over the work and tool, irrespective of whether it is oil or water, keeps the temperature at some reasonable level. Even though this function is extremely important the type of fluid used is less critical because it is serving only as a means of heat extraction.

The other and generally more important and certainly more critical function of cutting fluids is less widely understood. Again referring back to the tendency of a pressure weld to form between the work and the tool, the cutting fluid plays an important roll in minimizing this condition provided the optimum fluid has been selected. The purpose of the cutting fluid is to minimize the tendency to welding by attempting to get it to flow between the tool point and the steel chip. This is the phase which many people term as

lubrication though whether or not this term is applicable should be rightfully questioned. It is a proven fact that this function does not simulate most lubrication applications. For this reason common oils and even the highest quality lubricating oils may not always serve usefully as cutting fluids. This fact indicates that the action is one of a chemical nature rather than physical, which has been rather well established. This indication is further substantiated by the fact that one of the best cutting fluids known for minimization of pressure welding is carbon tetrachloride and anyone would readily agree that carbon tetrachloride would be one of the poorest for fulfilling normal requirements of a lubricant. Due to toxic fumes given off and certain other disadvantages, carbon tetrachloride is rarely em-

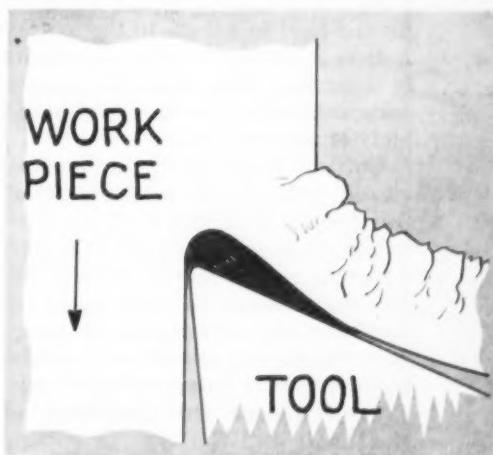


Fig. 2—Ductile metal chips tend to weld to the cutting tool, thereby forming an excessive built-up edge on the tool, which results in machining difficulties, as well as a poor finish on the workpiece that is being machined.

"... cutting fluids are designed for combating the tendency for the steel to adhere to the tool . . ."

ployed for any production machining applications though it is often used in special cases. It has been found most useful in solving certain machining problems.

Oftentimes problems come up where it takes considerable investigation to determine whether the fault lies in the tool, the cutting fluid or the work. Since many have come to regard carbon tetrachloride as about the ideal cutting fluid it will often serve to determine whether or not the main fault lies within the realm of the cutting fluids. It should be again emphasized that cutting fluids are engineered compounds; many of them contain sulphur or chlorine compositions which are especially designed for combating the tendency for the steel to adhere to the tool as well as to fulfill the other functions of a cutting fluid and still be safe and practical to use in the wide variety of machine tools.

Cutting fluids shall not be discussed further within the scope of this treatise since this is an extremely broad subject within itself, but the importance of properly selected cutting fluids should be emphasized because the full value of material selection cannot be realized without the aid afforded by proper cutting fluids.

Even though the condition of the tools and the type of cutting fluid employed can contribute a great deal, the greatest contribution is made by the composition of the steel workpiece. It is easy to understand that even the most ideal cutting

fluid can achieve its greatest value only when it is kept between the cutting tool and the workpiece, this being most difficult to achieve. Extremely high pressure exerted on the extreme point of the tool will tend to break down any fluid and leave metal to metal contact. Therefore, the most ideal situation would be to have within the steel some ingredient which will provide the desired machining characteristics. For practical purposes the steels which we regularly encounter may be considered as homogeneous alloys and any ingredient which could be added and dissolved in the alloy could hardly be expected to produce any appreciable difference relative to the type of chip that would form or its tendency to pressure welding.

Free machining additives must be ingredients of a sort which will not dissolve, but will form a dispersion of fine particles which might be likened to suspensions in aqueous solutions. Many materials have been tried, but most of the experimentation has centered around the use of graphite, sulphur, selenium, and lead. Upon occasions two of the foregoing have been used in combination. Graphite is a natural, since it is the material which is finely dispersed through cast iron and provides the brittle chip and relative ease of machining. Many different steels have been made in such a way that a certain amount of graphite will be precipitated in a high degree of dispersion throughout, with the intention

that these tiny particles of graphite will tend to provide machining characteristics similar to those possessed by cast iron. The degree of control required for such practice has hindered its use to the extent that it has never been of any great commercial importance. As of today there are certain grades of very high quality closely controlled steels made which do contain some highly dispersed graphite and there have been many attempts to make the more conventional alloy steels so that they contain a certain percentage of free graphite carbon, but so far the use of graphitic steels has never acquired a berth of sufficient importance to warrant further discussion at this time.

Sulphur has been and still is today the most widely used additive for producing free machining characteristics. This element does not exist in the steel as pure sulphur, but rather in the form of iron or manganese sulphides. These sulphides are distributed through the steel forming stringers in a rolled bar. The amount of sulphur employed for such purposes varies from about 0.050 up to 0.330 per cent. Most of the so-called re-sulphurized steels are incorporated in the AISI 1100 Series. Figure 3 shows a photo-micrograph of a low carbon re-sulphurized steel at 150X. This photo-micrograph was taken of a longitudinal section from a rolled bar. The black streaks are the sulphides which exist as a dispersion throughout the steel. It is easy to understand how a cutting tool passing through this form of material rapidly striking the tiny sulphides will refuse to

About the Author



HOWARD E. BOYER was educated in metallurgical engineering at Ohio State University, completing his course there in 1933. From 1933 until 1939 he was employed in the Metallurgical Department of the Cooper-Bessmer Corp., Grove City, Pa. In 1939 he joined the American Bosch Corporation, now known as the American Bosch Division of the American Bosch Arma Corporation, as Chief Metallurgist and occupies that post as of the present time. He has written approximately 60 technical papers, which have been published in the trade magazines of this country as well as England, France and Sweden. He has also presented several technical papers at the ASM National Metal Congress. Mr. Boyer has been active in a number of technical societies, primarily the American Society for Metals. He is a registered professional engineer in the Commonwealth of Massachusetts and is on the speakers roster for the ASM, as well as the American Society of Tool Engineers.

"... lead has been added to certain steels for the purpose of providing improved machining characteristics."

weld to the work and at the same time there is virtually no strength possessed by these particular sulphides which immediately promotes chip breakage.

The steel pictured in Fig. 3 actually contains about 0.250 per cent sulphur. The element selenium has also been used for similar purposes especially in the higher quality steels such as the stainless varieties. In many instances selenium and sulphur have been used in combination. In more recent years due to the demand for selenium for other purposes it has been used a great deal less as a free cutting additive. Selenium tends to cause stringers to form in much the same manner compared with the sulphides except they are usually finer and more highly dispersed.

For at least 25 years lead has been added to certain steels for the distinct purpose of providing improved machining characteristics. Making and processing leaded steels has brought forth their share of problems which have inhibited their widespread use. In a relatively few years prior to World War II a number of leaded steels were available, mostly in the low carbon non-alloy types. The lack of know-how in obtaining uniformity restrained its popularity, and then during the war our lead supply was required for other purposes which further inhibited its use as a free cutting additive. In the years immediately following World War II renewed efforts were

put forth in making and processing leaded steels of many different compositions. As of the present time it could be rightfully stated that the use of leaded steels is spreading like a grass fire. Practically none was made even as late as 1952 whereas about three hundred thousand tons were expected for 1955. Actual figures are not yet available.

Experimentation has incorporated varying amounts of lead added to molten steel for the purpose of improving machinability. As of the present time the actual amount is usually in the range of 0.15 to 0.35 per cent. Since lead is a soft metal and completely insoluble in steel it would seem to be a natural for providing machinability by causing chip breakage and minimizing the tendency for the steel workpiece adhering to the tool. The problem has been mainly one of adding the lead so that it was uniformly distributed. Such problems have now been mastered so that a small percentage can be finely distributed through the steel ingots which are subsequently used for making rolled bars and billets for forging.

The foregoing explanation in conjunction with the photomicrograph, Fig. 3, should provide a fairly complete answer relative to the question on how machining characteristics are imparted to steels. Now in regard to the sacrifice of mechanical properties it is very rarely that one can have his cake and eat it at the same time. This does hold true to

some extent relative to the sacrifice of mechanical properties. It is easy to understand in looking at the long sulphide stringers shown in Fig. 3 that these sulphides have virtually no hardness or strength so that for practical purposes they may as well be tiny voids within the steel which will naturally impair some of the mechanical properties of same. This is dependent to a great extent upon the direction in which the sulphides do exist.

In other words, considering a rolled bar the tensile strength might not be far if any different from a similar steel which is free from the excessive sulphur content. Most other mechanical properties do not drop severely if tests are made with

longitudinal specimens, but it is also easy to understand that when specimens are taken from cross sections mechanical properties such as tensile strength, yield strength, elongation and more particularly impact value and endurance limit are severely impaired. It is rather difficult to judge just how much because it depends entirely upon the amount of sulphur which is contained in the steel. It must be stated that some properties including low temperature properties may drop to a fraction of that found in a steel of similar composition and condition, but without the free cutting additive.

(To be continued in next month's issue)

★ ★ ★

Die Design Handbook. By American Society of Tool Engineers, Frank W. Wilson, Editor-in-Chief. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. Illustrated. Cloth binding, board covers. Price, \$14.50.

Drawn from technical resources of the American Society of Tool Engineers and hundreds of companies making and using dies, this book represents the best die design practice of many members, and puts a wealth of factual, proven design data in your hands. Turning to this book, a designer "may find some one service-proved design that can save 90 per cent of his developmental time and effort, with the other 10 per cent related to more conventional design matters already well-known to him." Significant dimensions shown in many of the designs will aid when adapting to various other purposes.

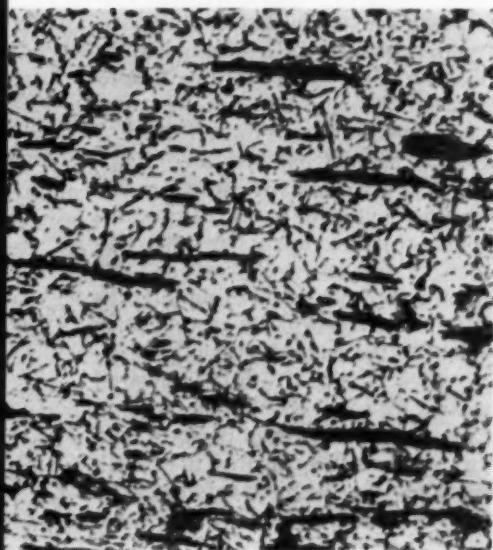


Fig. 3 — Photomicrograph showing sulphide stringers in a longitudinal section of resulfurized low carbon steel. The magnification in this particular instance is 150 times.

Shaping Integral Keys

Carbide tooling setup is used in cutting integral keys on cored bronze stock

By F. E. RILEY

With some forms of thin-walled bushings, it is often desirable to key such bushings to a member fitting over the external periphery. A key cannot be cut in the bushing wall, in the usual manner, because of the thin section available for this purpose. A typical bushing with an integral key is shown at X in the accompanying drawing. This particular bushing is 2 inches long overall and has an external diameter of 1½ inches. The material is bronze and the wall thickness is 3/16 inch.

A small shop was given the job of producing a quantity of these bushings. Cored bronze stock was used as the basic material for the bushings. To cut down on the weight of material used and reduce the amount of machining required, the material was first bored and cut off in a lathe. The central hole in the bushing was bored eccentrically to the exterior; the integral key was to be located at the high point of eccentricity.

In Sketch Y of the drawing the circumference of the bronze stock is shown by an external full line and the position of the key with its attendant 1½-inch diameter is shown as a broken line. It will be noted that there is very little metal to be removed from the bushing exterior

directly opposite the key, while the maximum amount of metal to be removed is located on either side of the key.

One efficient technique for producing bushings of this type in quantity is to use a gear shaper with a circular cutter especially designed to produce the integral key while rolling in mesh with the bushing exterior. However, a gear shaper was not available, so a standard 16-inch shaping machine was adapted to do the work. Very little modification to the standard shaper was needed, and the special tooling required did not prove to be very expensive.

The procedure for shaping the bushing exterior so as to produce an integral key is shown schematically in Sketches Y and Z. The shaping tool, which is designated as A, must be accurately ground with regard to the angle between its sloping sides; a slight radius is ground on the forward end of the tool to conform to the radius of the bushing. This radius insures a smooth finish for the bushing exterior. The shaping tool is tipped with cemented carbide to provide long life between grinds. The tool must be set carefully in the holder on the shaper ram in the interest of precision.

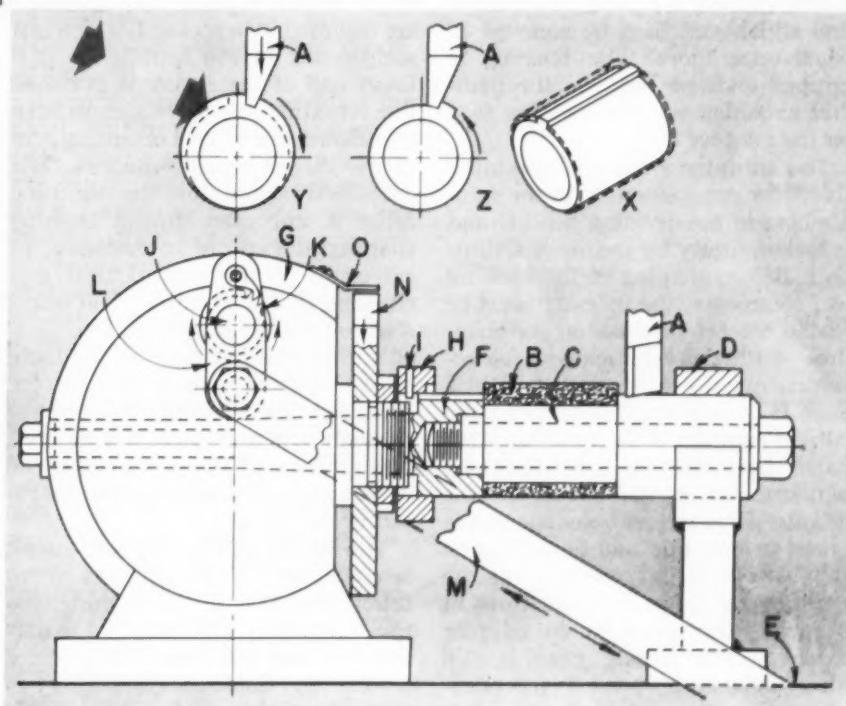
With the bushing in place on the

mandrel made for it, and positioned with the high point of eccentricity uppermost, the first operation is to feed the cutting tool downward to the depth shown in Sketch Y. The particular machine used had automatic down-feed for the toolslide and was equipped with an automatic depth stop to disengage the feed at the desired point. As the tool is fed down, it automatically shapes out one side of the key, as shown in Sketch Y.

The next step is to rotate the bushing in a counterclockwise direction, as shown by the arrows, until it has reached the position shown in

Sketch Z where it will be noted that the bushing exterior is finished to size and the key is fully formed. The slight radiusing at the top of the key caused by the bar stock material was ignored as these bushings were sized finally by forcing them through a simple shaving die by means of a hydraulic press, and this process flattened the top of the key in a satisfactory manner.

It will be appreciated that some means had to be provided for rotating the bushing during the shaping process and for controlling the width of the key produced. The set-up finally evolved is illustrated in



Drawing showing equipment and method for shaping integral keys on thin-walled bushings.

"... width of the key produced is controlled by the amount of rotation imparted to the bushing."

the lower portion of the drawing.

The bushing *B* is mounted on the mandrel *C* which is located in a shouldered and threaded recess at the left-hand end and is supported at the right-hand end in the bracket *D* which is fastened to the shaping machine table *E*. To mount a bushing, a suitable wrench is engaged with the hexagon on the end of the mandrel *C* which is then unscrewed so that it can be slid axially toward the right and the bushing removed. A new bushing is placed on the mandrel which can then be screwed in place once more. The bushing is gripped endwise between the mandrel shoulder and the locating face on the adapter *F*.

The adapter *F* has a Morse taper shank for engagement with the spindle bore in the dividing head *G* and is locked firmly by means of a draw bolt. Before shaping of the bushing can commence, the bushing must be in the correct position on the mandrel—with the high spot of the eccentric exterior at the top. A setting gage *H* is provided for assuring the correct position of the bushing. This gage comprises an annular ring which slides on the outside of the adapter *F*. It has an eccentric recess bored in one side and is located in the correct radial position on the mandrel by a pin *I* which slides in a keyway machined on the adapter exterior. The setting gage is slid along the adapter until its recess engages with the end of the bushing; engagement will not take place un-

less the bushing is in the correct position and the bushing can be turned on the mandrel to insure this condition before it is finally locked in place. After use, the setting gage is moved to the left so as to be clear of the shaping tool.

A standard small plain dividing head is mounted on the shaping machine table and its worm spindle *J* is cleared of the division plate mountings and other fittings. On the worm spindle is mounted a ratchet wheel *K* and a pawl, both of which are enclosed by a rocker *L* which can reciprocate on the spindle. To the lower end of the rocker is attached the actuating arm *M* which in turn is fastened to the pawl operating arm of the shaper cross-feed screw. The cross-feed screw for the machine table is not used during bushing shaping; the arm *M* is, therefore, an extension of the normal feed mechanism of the machine. The worm shaft on the dividing head is actuated in the same manner as the table cross-feed screw, thus causing the dividing head spindle to rotate through part of a circle during each ram stroke and thereby feeding the work against the shaping tool by rotating the work.

The width of the key produced is controlled by the amount of rotation imparted to the bushing; too much rotation will result in a narrow key and too little will produce a wide key. Some consideration was given to the use of an automatic feed disengagement device; however,

it could not be easily provided without complication and expense. Inasmuch as an operator had to be in attendance on the machine the entire time it was operating, it was decided to utilize him for controlling the amount of bushing rotation by providing a visual indicator of key width.

The indicator comprises a plain disc *N* mounted on the spindle nose of the dividing head. On the exterior of the disc are marked the starting positions for the initial down feed and the position for stopping the circular feed when the key is at the correct thickness. The positions are indicated by engraved lines which are used in conjunction with a stationary marker *O* attached to the dividing head.

A crank handle is provided for attachment to the end of the worm shaft; this is used by the operator for setting the starting position and for applying the final feed increment when taking the last few tool passes along the key. The feed rotation imparted to the bushing is equivalent to a cut of 0.004 inch. When the tool is passing over the shallowest part, which is opposite to the key, the operator can stop the mechanical feed by switching the feed pawl out of engagement and turning the worm shaft at a faster rate. When the cut becomes heavy again, the power feed is re-engaged. It might be mentioned that the pawl spindle is provided with a knob so that it can be readily swung clear of the ratchet on the dividing head worm shaft.

The highest ram speed that was available on the shaping machine

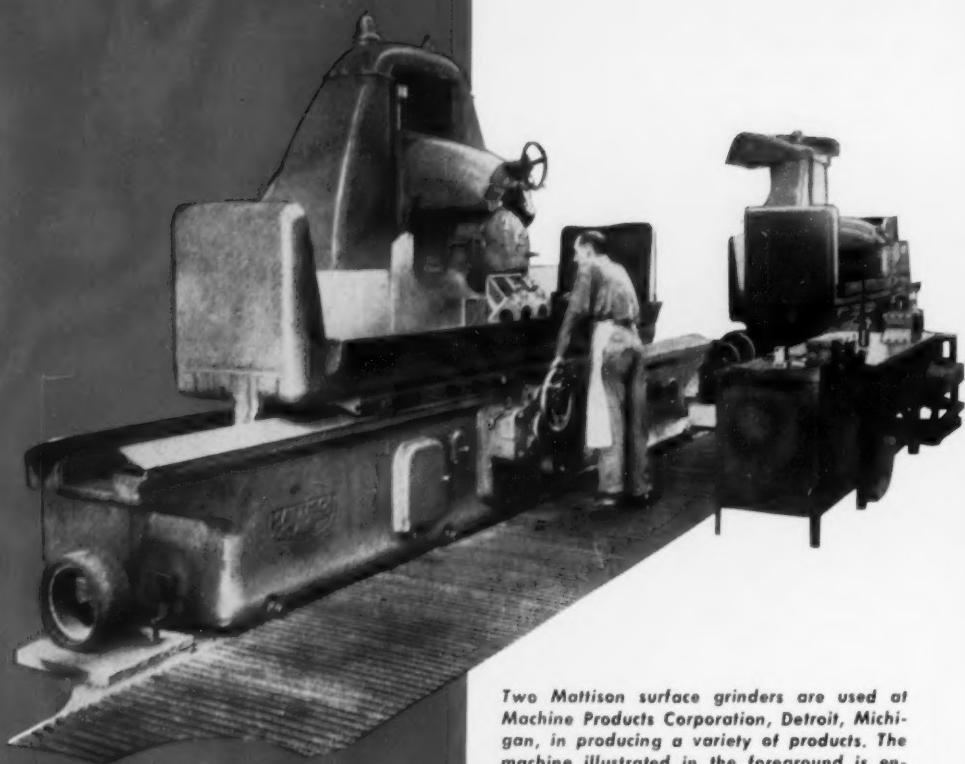
was 240 strokes per minute and this speed was utilized for the job. The total time taken to shape out the 1½-inch periphery was 4½ minutes using power feed all the way. The longest floor-to-floor time per bushing is about 6 minutes. By accelerating the feed over the shallowest parts of the cut, an operator can produce one bushing every 5 minutes.



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Two Mattison surface grinders are used at Machine Products Corporation, Detroit, Michigan, in producing a variety of products. The machine illustrated in the foreground is engaged in the grinding of Meehanite V-blocks.

Surface Grinding V-Blocks of Mechanite Iron

By JOHN E. HYLER

Grinding tolerances on V-blocks must be closely held. When one purchases V-blocks, he wants blocks on which all sides are perfectly square and in which the vee is precisely 90 degrees, all dimensions being held to close tolerances. Machine Products Corporation, Detroit, Michigan, a leading manufacturer of surface plates, angles, parallels, V-blocks, straightedges, cylinder squares and similar products, produces V-blocks held within a tol-

Heavy-duty horizontal spindle surface grinder is used to machine V-blocks to a tolerance of 0.0005 inch.

erance of 0.0005 inch. This work is readily accomplished on a horizontal spindle heavy-duty surface grinder made by Mattison Machine Works, Rockford, Illinois. A Carborundum 32A36-H12VBEP grinding wheel is used as well as Cimcool coolant, diluted 100 to 1.

Grinder in Use Long Time

The grinder employed has been in use for a considerable length of time, but has no difficulty in producing this and other close-tolerance work. The Meehanite V-blocks are ground two at a time, mounted in a fixture which is held on a magnetic chuck. The grinding wheel that is used for the operation is of sufficient diameter to allow the wheel flange to clear the work properly.

An interesting aspect of this plant is the stress laid on good housekeeping in general, and machine cleanliness in particular. In the opinion of operatives, the good housekeeping practiced by the company is definitely a contributing factor in shop precision. Each man is allowed time at the close of each shift for cleaning his machine. In addition, the grinding area in its entirety is thoroughly cleaned each week.



Close-up view of V-block grinding operation. Work fixture is equipped for holding V-block firmly in position while it is being ground.

METROLOGY LABORATORY --



Fig. 1—The new Eli Whitney Metrology Laboratory, opened in Dayton, Ohio, by The Sheffield Corporation, is said to be the only metrology installation in the world having temperature control held to within 1/20 of 1 degree of the standard 68 degrees F.

Y -- One of World's Unique Wonders

Laboratory is equipped to provide standard measurement to accuracy of 0.000001 inch.

By FRED W. VOGEL
Editor



The Eli Whitney Metrology Laboratory, newly established at Dayton, Ohio, on the premises of The Sheffield Corporation plant, is named in honor of the pioneer American industrialist who in 1799 laid the foundation for American mass production and industrial development by proving his then revolutionary concept that manufacture of interchangeable parts was possible under a system of adequate dimensional control. This laboratory, a corner view of which is shown in Fig. 1, is equipped to provide modern industry with precise, standard measurement, certified to an accuracy of one-millionth of an inch. Such a dimension is to one inch what an inch is to 15.8 miles. In terms of "split hair" comparisons it can be described as sub-dividing the diameter of a human hair into more than 3000 parts. It is a new addition to the great precision resources that have sup-

"... air conditioning equipment holds relative humidity to less than 50 per cent to prevent rusting of instruments."

ported Sheffield gages and measuring instruments over the years.

In dealing with such refined measurement, the effect of variable room temperature in causing minute changes in the size of the metal gage blocks being tested makes absolute temperature control of extreme importance. This laboratory is said to be the only metrology installation in the world in which environmental temperature control is achieved to an accuracy of 1/20 of 1 degree F.

Into the design of this facility went years of research and study of all the leading government standards laboratories of Europe and America. The result is a composite of the best features of the National Physical Laboratory of Teddington, England; the International Bureau of Weights and Measures, Sevres, France; the Labatoire Centrale de L'Armament, Paris; the Physikalisch-Technische Bundesanstalt, Braunschweig, Germany, and especially the National Bureau of Standards, Washington, D. C.

The entire floor space of the laboratory (840 square feet) is structurally independent of the rest of the building in which it is located, being mounted on detached separate footings. The floor base is composed of an 8-inch layer of concrete, upon which rests a 4-inch layer of insulat-

ing cork, topped by another layer of concrete surfaced with plastic tile. The 8-inch walls are insulated with glass wool faced with aluminum to provide protection as a heat reflector and vapor barrier. The structural ceiling, 36 inches above the perforated sub-ceiling, is insulated with a 4-inch cork slab. The window, which provides an overall view of the laboratory from the main lobby of the building, is of Thermopane glass.

Within the laboratory is a smaller room having its own separate temperature controls. This room, which houses the master interferometers used in calibrating master reference blocks to light-wave accuracy, also contains instruments for accurately measuring barometric pressure—another important environmental factor in gage block inspection and measurement. Elaborate and specially designed air conditioning equipment not only holds the temperature to a standard 68 degrees F. at all times, rapidly compensating for the body heat radiated by people entering the room, but also holds the relative humidity to less than 50 per cent to prevent any surface rusting of delicate instruments.

In the chamber between the structural ceiling and the sub-ceiling of the lab, air from various sources is blended, cooled and then heated and

cleansed by electrostatic precipitation. Without any drafts, this conditioned air enters the laboratory evenly through the perforations of the sub-ceiling. Air within the room is completely changed every five minutes, being exhausted into the air-lock entrance chamber designed to prevent untreated outside air from filtering into the lab.

The instruments used in this laboratory include apparatus of American, German, English and Swiss origin. The master instrument for light-wave comparison measurement is the Zeiss Koesters Absolute Interferometer, shown in Fig. 2, which uses light sources of either helium, krypton, cadmium or the mercury 198 isotope.

Measurement and inspection serv-

ices available to private industry and government at this laboratory include: gage block calibration, parts contour measurement, surface finish analysis, plain and taper plug and ring gage calibration, measurement of cylindrically ground parts, master setting gage calibration, surface plate and parts flatness calibration, thread gage calibration, calibration of thread and gear measuring wires, measurement of precision threaded parts, hardness testing, end measure calibration, calibration of precision circles and fibre fineness measurement. Consulting services for the establishment of industrial metrology facilities, training and educational services in precision measurement and product dimensional audit services are offered by the laboratory.

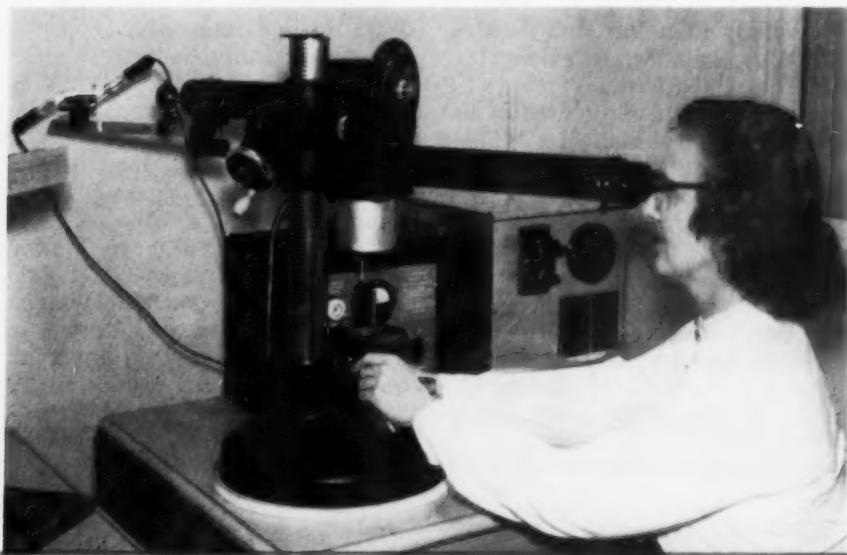


Fig. 2 — Mary Hoskins, metrologist in The Sheffield Corporation's new Eli Whitney Metrology Laboratory, is shown setting up an

interferometer for the purpose of measuring the length of a 2-inch master gage block to an accuracy of one-millionth of an inch.

Throw-Away Tool Blanks Speed Engine Parts

Solar Aircraft Company reports 150 per cent production increase in jet engine parts and gas turbine components by the use of new tooling technique.

By L. B. LORAIN

A 150 per cent increase in the number of pieces the company is able to machine from a single tool bit by using the new Carmet CA-610 throw-away tool blank has been reported by Solar Aircraft Company, San Diego, California.

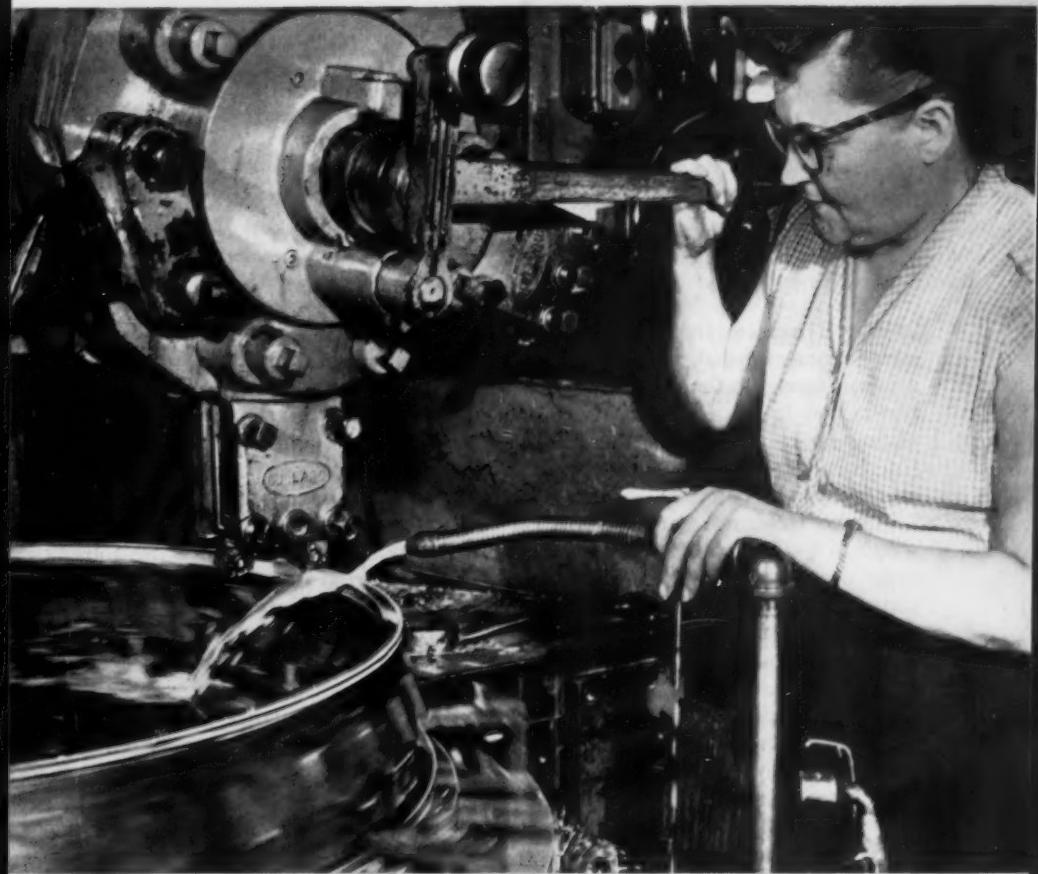
The CA-610 blank is used in the machining of material going into jet engines and solar reports that it is able to get 1,200 to 1,400 cuts from a single blank. There is also a 7 per cent saving of down time, since the blanks are designed for quick insertion in all types of tool holders. The tool insert is being used with a 7-degree negative rake angle for roughing cuts and a 6-degree positive rake angle for the purpose of machin-

ing thick section material most effectively.

CA-610 is one of the new cutting grades recently introduced to the trade by the Carmet Division, the carbide producing facility of Allegheny Ludlum Steel Corporation. This material is being used at Solar for some of the facing and turning operations on gas turbine components, as well as extensively in the company's machine shop.

According to Solar engineers, with the material there is no cratering to speak of and side wear is slight. Previously, a tip could be used on only 28 pieces cut by Solar; now the company is using the CA-610 on 80 pieces before replacing.

s Speed Machining of Jet e Parts



Solar Aircraft Company uses Carbide CA-610 throw-away tool blanks in machining jet engine parts and gas turbine components. The operator shown here is machining a compressor case for an advanced design jet engine. Two facing cuts

are made on each part. Solar engineers report that operators can get 1,200 to 1,400 cuts from one blank before it needs replacing. Cuts can be made on more than 80 of these and similar parts with the aid of only one CA-610 blank.



Fig. 1—Removing weld discoloration from an inside corner.

Removing Steel

By W. E. McFEE
Supervisor, Product Information
Service, Armco Steel Corporation

A how-to-do-it article, telling what type of electrolyte, electrode and power source to use.

Welding stainless steel requires great heat. Heat discolors areas adjacent to the weld. The problem is how to get rid of this discoloration, especially in hard-to-reach inside corners where mechanical methods would be costly.

Armco Research came up with a solution to the problem—an electrolytic process using alternating current. One terminal from an a.c. power source is connected to the work and the other terminal to a suitable electrode. Sufficient electrolyte is then poured into the welded corner to cover the discolored area. The electrode should be in contact with the electrolyte but not touching the work surface, as shown in Fig. 1. Where the electrolyte cannot be contained—such as on outside corners—the electrode can be wrapped in cloth and soaked with electrolyte.

What Electrolyte to Use

The most practical electrolyte is a 50 per cent (by volume) solution

of commercial (75 per cent) phosphoric acid in water. It gives off no odor, does not fume, and produces uniform color of the cleaned area. Higher concentrations will produce a bright surface but require more time. Lower concentrations produce a dull surface. If it is important to the work at hand, the concentrations may be varied to match the cleaned areas with the original surface.

No more electrolyte than is necessary to cover the discolored areas should be used. Cleaned areas should be rinsed thoroughly with water after the discoloration is gone.

A General-Work Electrode

A general-work electrode can be made by taking an 8-inch length of $\frac{1}{4}$ -inch round copper and bending 1 to 2 inches at one end to a 90-degree angle and 1 to 2 inches at the other end to an angle of 45 degrees. Whichever end is most effective can be used in applying the electrode to the work. To insure positive electrical

Discoloration from Stainless Weld Areas

separation from the work, the working area at each end of the electrode is protected by two rubber insulators, as shown in Fig. 2. Special electrode shapes may be used for special applications, but the principle remains the same.

When proper connections have been made, as described earlier, the electrode is placed in the electrolyte, allowing the rubber insulators to contact the work. Cleaning action starts when the electrical circuit is completed through the electrolyte. The working area of the electrode is rubbed gently over the discolored area. Caution should be exercised so as not to permit the bare rod to touch the work and cause a short circuit.

"Pad type" electrodes, such as shown in Fig. 3, are effective for

cleaning flat surfaces or outside corners. These include the rod type electrode just described for inside corner work. The other electrode is a flat copper strip about $1/16$ to $1/8$ inch thick by $1/2$ to 1 inch wide, of any convenient length. Sometimes one end of the electrode is bent for easier application.

In both types the working end of the electrode is covered with glass cloth or asbestos paper. The resulting pad is dipped in the electrolyte and applied directly to the discolored area. The pad is kept moist until the work is done.

Power Sources

Any suitable low-voltage transformer may be used with the electrodes in cleaning welds. The transformer is plugged into either a 110



Fig. 2—Illustration of a handy electrode for general work formed from a copper rod.

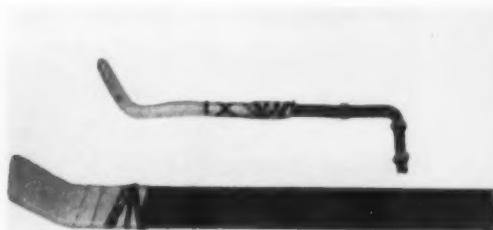


Fig. 3—These "pad type" electrodes can be used on flat surfaces or outside corners.

"Intensity of discoloration . . . governs the time necessary to remove weld discoloration."

or 220-volt circuit. Satisfactory weld cleaning requires 4 to 24 volts. The upper voltage side indicates shorter exposure time, usually required for relatively large areas. The lower voltages mean longer time and are practical only for smaller areas. Voltages too high for the area covered cause fuming and spattering. Voltages should be adjusted to obtain the desired results.

Time Required

Intensity of discoloration, area covered by the electrode, and voltage applied govern the time necessary

to remove all weld discoloration.

The following example gives an indication of this fact: The work was a right-angle joint prepared by inert-gas tungsten arc welding. The inside of the joint was cleaned at the rate of 4 feet a minute, using a $\frac{1}{4}$ -inch diameter copper electrode with a 1-inch working area and operating at 8 volts, a.c. Current measured was 3 amperes. The electrolyte was 50 percent phosphoric acid. The outside of the joint was cleaned with a glass wool covered electrode soaked in the same electrolyte. Cleaning speed was $\frac{2}{3}$ foot a minute.



Machine Grinds 40-Foot Screw

Finish-grinding a screw thread 40 feet long from solid steel stock is the unusual job recently accomplished by a Style 120 Precision Thread Grinder manufactured by Ex-Cell-O Corp., Detroit 32, Mich. This "king-size" thread— $3\frac{1}{2}$ inches in diameter with a 0.750-inch lead—

is a gothic-type radius form designed for use with an anti-friction circulating ball nut. Extra-long screws of this kind are widely used for actuator mechanisms in aircraft and in special machine tools. While this 40-foot screw length is believed to be exceptional, no unusual problems were encountered in the setup or in the actual grinding operation.

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HOW TO GET THE MOST FROM



At the Calumet Manufacturing Company, Chicago, this Delta abrasive cut-off machine is used in cutting stainless steel angle irons and

brass and copper tubing, which is employed in manufacturing the Calumet 8 x 10 camera and photographic processing equipment.

Cut-Off Machines...

Recommendations for cutting off ferrous and non-ferrous metals with this equipment are given.

The cutting off of ferrous and non-ferrous metals can be a costly or money-saving operation to industry, depending upon the conditions of use and selection of wheels for the work. Studies, conducted by the Delta Power Tool Division of Rockwell Manufacturing Company, indicate that practically every manufacturer of metal products has a use for the cut-off machine. Because of its relative newness on the industrial scene, this machine is sometimes misused, according to the Delta technicians.

The proper use or misuse of the cut-off machine often lies in the choice of wheels. For cutting hard materials, a soft grade of wheel is recommended; hard materials tend to dull the grit more rapidly, while a softer bond tears the grit away to expose sharp grit to the work.

The shape of the part to be cut also influences wheel choice. For example, a softer wheel should be used to cut solid stock than is necessary on tubular stock. Tubing presents a small contact area to the wheel and, thus, higher unit pressure, which tends to break down the bond more rapidly.

How to Cut with Abrasive Wheels

In cutting ferrous metal, best results are obtained by feeding the

wheel into the work as fast as possible. Feeding pressure should be applied steadily, after the wheel is in contact with the work, but not to the extent that the wheel is slowed considerably. The faster the wheel is fed through the work, the greater the wheel life obtained.

Burrs on the work often present a problem in metal cutting with abrasive wheels. In cutting hard materials, burrs present no great problem and any that do occur are so hard and brittle they are quickly and easily removed.

When cutting soft materials, an abrasive wheel has a greater tendency to create a burr, which is sometimes difficult to remove due to the ductility of the stock. This problem can be reduced, and in some cases eliminated, by using a softer grade of wheel although, possibly, at the sacrifice of some wheel life. When cutting high carbon steel, which subsequently is to be machined, work hardening of the surface occasionally occurs. Wet cutting is often the answer to this particular problem.

Cutting Non-Ferrous Metals

While copper, brass, aluminum and other non-ferrous metals can be cut with abrasive wheels, tests indicate that it is often more advantageous to use a high speed metal



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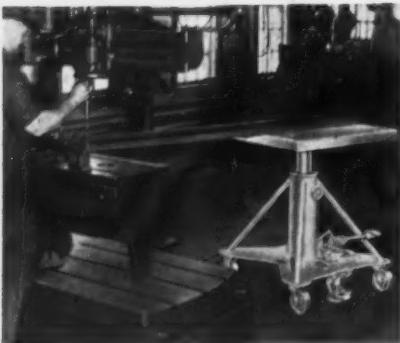
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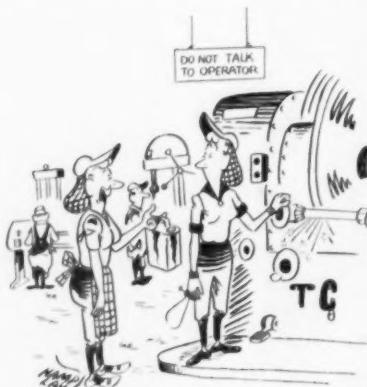
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Cut-Off Machines . . .

cutting saw in the cut-off machine. Made of high speed steel or special high carbon, high chrome alloy of low filing temper, the blade is hollow ground for most effective clearance. Inasmuch as the machine is only as good as the blade, the latter should be properly treated and kept sharp at all times. The saw blade, operating at a speed of 2,000 r.p.m., cuts nonferrous metals quickly and with practically no burr.

In cutting round material, both the saw blade and abrasive wheel have a natural tendency to rotate the work. This movement can cause work spoilage, as well as damage to the blade or wheel. For cutting round material, a simple clamp mechanism is recommended for holding down the work. This device is especially useful in making angular cuts, since the operator is protected from rotating or sliding work.

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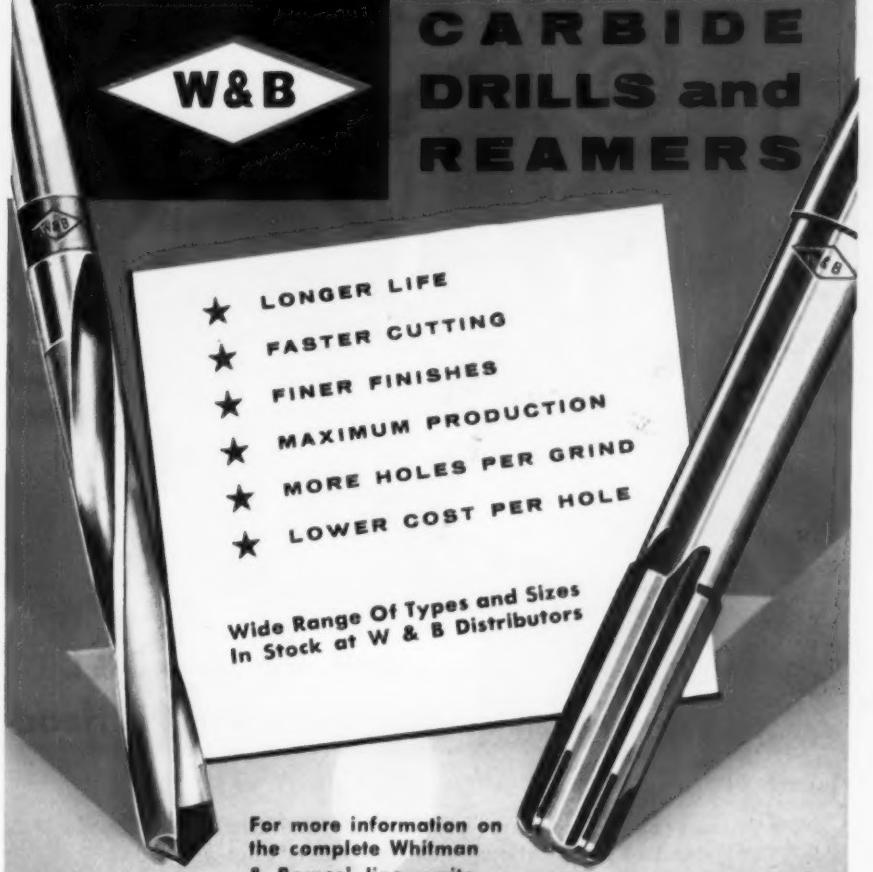


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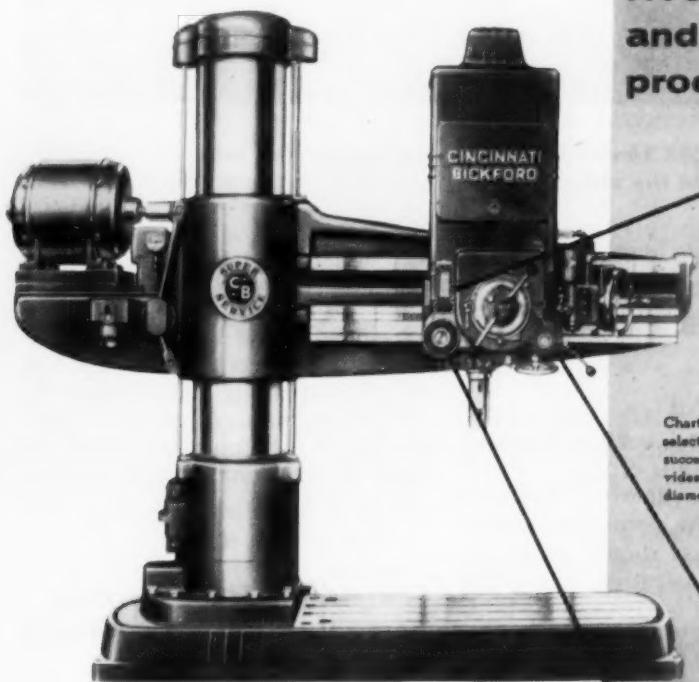


Chart guides the operator in pre-selecting speeds and feeds for succeeding operations. It provides a permanent record of tool diameter, speed and feed.



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Hydraulically pre-selects all 36 speeds. Speeds and tool diameters are shown in large easy to read figures.

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ideas from readers

SIX time-saving suggestions for the man in the shop.

Unique Brushing Method for Cleaning Set Screw Threads

By IRA S. ROBERTS

It formerly took 18 seconds to clean the threads of $2\frac{1}{2} \times \frac{3}{4}$ -inch set screws. The time was cut to 2 seconds with the simple but unique brushing method shown in the accompanying illustration. The opera-

tor feeds the screws into one end of a pipe, as illustrated, and an Osborn wire filled power brush makes contact with the work at a slot cut in the pipe, spinning and cleaning the threads uniformly. A small stationary wire brush, inserted through the pipe, controls rotation and traverse of the work.

* * *

Hinged Block for Holding Portable Tools Horizontally in Vise Jaws

By H. E. JOHNS

Many mechanics frequently hold small portable grinders, portable drills, and other types of portable tools, both air and electric powered, in a vise. Generally, the tools are held in a horizontal position, converting them temporarily into small stationary machines. There are some types of highly-intricate and highly-accurate free-hand grinding operations, for instance, in which there is no better arrangement than to hold a portable grinder in a horizontal position in a vise. While some might consider

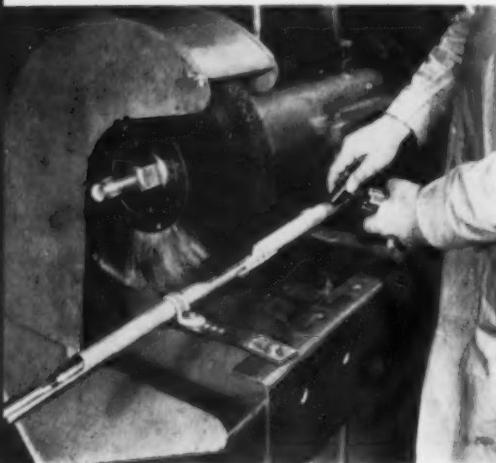
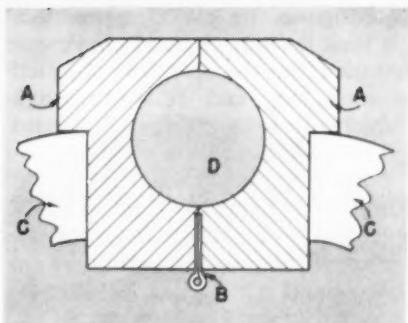


Illustration showing unique method used to reduce time in cleaning set screw threads.



Cross-sectional sketch of hinged block designed for holding portable tools horizontally in vise jaws without damage.

such tools sufficiently staunch to allow them to be directly clamped between vise jaws (especially if soft jaws are used and a moderate amount of care is employed), vise jaws may be padded if desired.

Where such tools are clamped between vise jaws more or less continually, however, it may be well to keep a pair of padded wooden V-blocks at the vise location, and sandwich an electric or pneumatic tool in between them before placing the tool between the vise jaws. An arrangement still more convenient where tools used in this manner are always of the same diameter, or where only one tool is repeatedly clamped in a given vise in this way, is to make up a special hinged block from two pieces of wood, as shown in the accompanying sketch. Both of the pieces designated as A are worked out together, in a somewhat longer piece, which is then cut in two. Turning one piece end for end in relation to the other will provide an identical pair, which may be hinged together as shown at B.

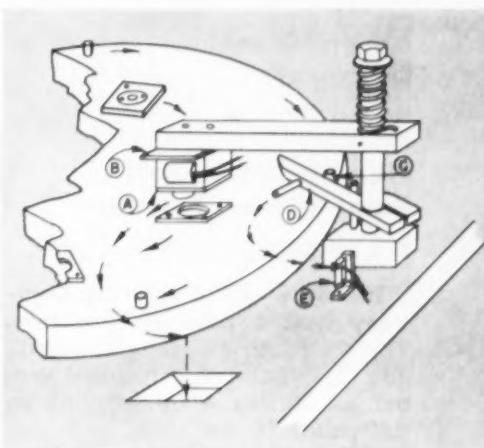
Advantages are that two jaws thus hinged will always be together and can be thrown open to receive the portable tools and then closed upon it. Provided with a rabbet in the manner shown, the pieces A will automatically rest atop the vise jaw C in such a manner as to maintain the axis of the opening D horizontal, thus holding the tool horizontal. The opening D is shown here as truly circular; however, in practice, the opening left will be slightly less than a circle to provide a modicum of actual clamping action on the tool housing.

★ ★ ★

Unloading Attachment for Rotary Fixture

By FREDERICK BARKER

To facilitate the job of unloading a nested part from a rotary fixture where adequate equipment for



Sketch showing operation of magnetic type unloading attachment for rotary fixture.

ideas from readers . . .

air ejection was not available, we devised the magnetic type of unloading attachment shown in the accompanying sketch. The attachment consists of a magnet, *B*, with a continuous duty type solenoid to which is attached a piece of phenolic material, *A*, that helps prevent any tendency for the parts to "hang on" the magnet after the circuit has been opened. Unloading takes place at the same time that the work cycle is being performed at another station.

As the rotary table indexes under the magnet *B*, which is continuously energized, the workpiece is attracted straight upward to it. As the pin *C* contacts arm *D*, the entire assembly pivots in order to clear the fixture. In this position, the magnet circuit is held open as the result of arm *D* opening the normally-closed micro-switch *E*, thus allowing the part to drop free through the hole in the bench and into a tote pan under the bench.

★ ★ ★

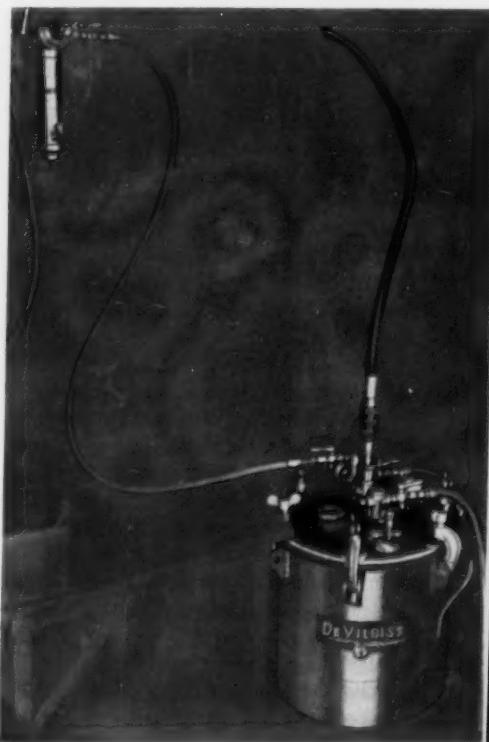
Flexible Shaft Solves Paint Stirring Problem

By C. HOTCHKISS, JR.

The Stow Manufacturing Company had a painting problem. The company was using an aluminum base paint that required continuous stirring while spraying on the paint. If the paint were not stirred continuously, the aluminum would settle to the bottom of the tank, causing the color of the paint

to change as the level dropped near the tank bottom. A hand crank was provided, but the operators objected to such long and tedious work (which often meant that the paint did not get thoroughly stirred).

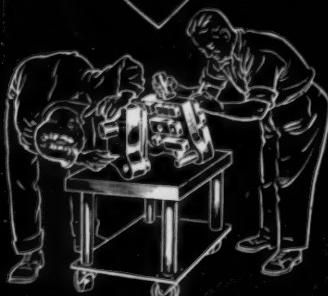
Stow decided to use a motor to power the stirrer, so that it could operate continuously all day. If the motor were mounted directly on top of the paint tank, however, the cover would be very heavy to remove. Therefore, Stow decided to use one



Flexible shaft, connected from spray painting tank to motor-operated gearbox on other side of wall, permits aluminum paint to be continuously stirred so as to prevent the aluminum from settling to the bottom of the tank.

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of its own flexible shafts to transmit the power, mounting the motor away from the tank. If the motor were installed in the same room with the paint, however, an explosion-proof motor would have to be used.

To eliminate this problem, a hole was drilled in the wall of the painting room and a $\frac{1}{8}$ h.p., 1,725 r.p.m. motor was installed on the other side of the wall, together with a 30:1 ratio gearbox that reduced the stirring speed down to 57 r.p.m. Stow used one of its standard 6-foot long 40S power drive flexible shafts to connect the gearbox to the paint tank.

This equipment has been operating every day for over two years with no difficulty whatsoever.

★ ★ ★

Novel Scrap Segregation Method

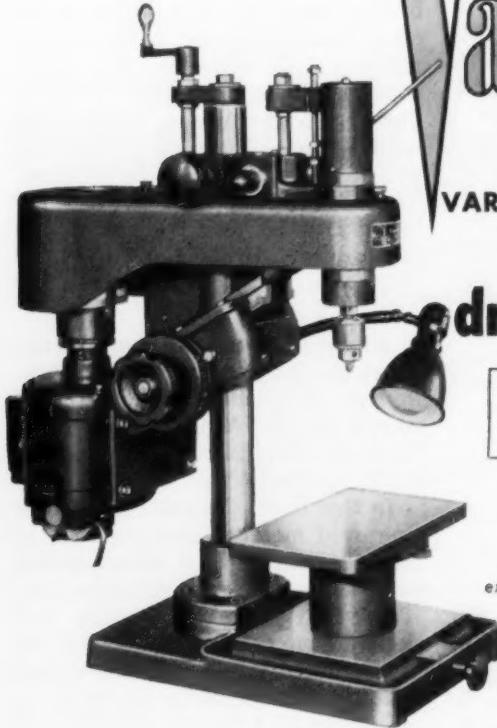
By B. G. LAWRENCE

Baby baths have taken an important place on the production line in the Conservation Program of the Clifton plant of Federal Telephone and Radio Company, a division of International Telephone and Telegraph Corporation. These small plastic tubs with drainage holes drilled in the base are placed in the



Plastic baby bath with drainage holes in base is used to catch turnings of parts machined on hand screw machine in Clifton plant of Federal Telephone and Radio Company.

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beds of hand and automatic screw machines to catch the turnings of parts machined directly above them. As several types of metal are run off each day, the tubs are replaced at the end of a run and the scrap is deposited in its respective container.

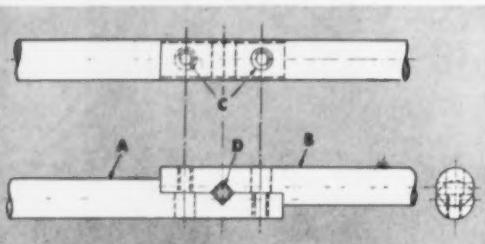
This segregation of scrap has virtually eliminated scrap contamination from this source and, accordingly, this scrap control portion of the Conservation Program has resulted in increased revenue from the sale of generated scrap. It has also substantially reduced the work of separating and handling mixed scrap, which formerly resulted before these tubs were installed.

★ ★ ★

Tap Wrench Made of Bar Stock

By EUGENE BARKER

A quick and easy method for making an adjustable tap wrench from two pieces of round or square bar stock and two cap screws is shown in the accompanying sketch.



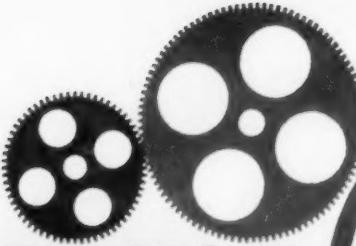
Sketch of adjustable tap wrench that has been made from a piece of round bar stock.

The ends of the two bars *A* and *B* are first milled flat and overlapped, as shown, and holes are then drilled and tapped for the locking screws *C*. Next, a third hole, indicated by the broken-line circle *D*, is drilled in the other plane with both halves bolted together. The halves are then separated and the resulting half-holes filed into vee-surfaces of a size somewhat smaller than the smallest square end of the tap to be chucked. The wrench can also be used for larger taps by readjustment of the cap screws.

★ ★ ★

Dimensions and Tolerances for Mass Production. By Earle Buckingham. Published by The Industrial Press, 93 Worth St., New York 13, N. Y. 164 pages. 179 illustrations. Cloth binding. Price, \$8.00.

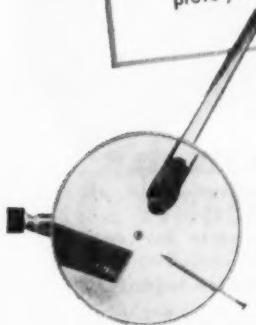
In this book, the author proposes improved methods and practices to meet the problem of dimensioning with tolerances, and discusses their relation to production design, tool design, gage design, production and inspection. In analyzing the uncertainties in present-day practice, he points out that the actual method of expressing dimensional information is of secondary importance. What is important is the recognition that several kinds of dimensions are needed on component drawings, and that several types of conditions must be definitely controlled by tolerances. In brief, the thesis is that all limiting conditions must be controlled by definite inspection procedures and it must be possible to translate every limiting dimension into a definite design and size of inspection gage.



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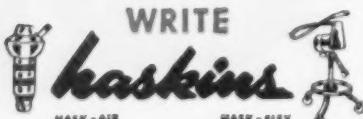
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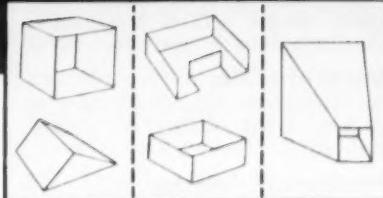
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Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22, Pa. Data sheet on stainless steel, Type 301.

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West Disinfecting Co., 42-16 West St., Long Island City 1, N. Y. "The Control of Dermatitis in Industry."

45. Work Positioner

Wilton Tool Manufacturing Co., Inc., 9525 Irving Park Rd., Box 56, Schiller Park Ill. PowRarm work positioner for assembly, welding or positioning.

46. Taps

The Wood & Spencer Co., 1930 E. 61st St., Cleveland 3, Ohio. Tap catalog and guide gives complete data.

47. Nameplate Press

Geo. T. Schmidt, Inc., 1806 W. Belle Plaine Ave., Chicago 13, Ill. Nameplate detail press, Models 4 and 6.

48. Protective Coatings

Seal Strip Corp., 57 Meeker Ave., Brooklyn 22, N. Y. Transparent and non-corrosive coatings for all tools and metal parts.

49. Gages

Dearborn Gage Co., 22038 Beech St., Dearborn, Mich. Quality controlled gages, produced to A. G. D. standards.

50. Test Indicators

Superior Indicator Co., P. O. Box 734, Rochester 3, N. Y. Double faced dial surface test indicators.

51. Cutting Tools

Fastcut Tool Co., 7405 E. Davison, Detroit 12, Mich. Combined drills and countersinks, center reamers, Woodruff keyseat cutters and a tool crib set.

52. Drill Heads

Johnson Drill Head Co., 23rd Ave. and 20th St., Rockford, Ill. Top-flite tapping and boring heads and adjustable or fixed drill heads.

53. Perforating

Pivot Punch & Die Corp., Punch Division, N. Tonawanda, N. Y. Perforating problems and their solutions.

54. Die Casting Machine

The Cleveland Automatic Machine Co., 4940 Beech St., Cincinnati 12, Ohio. Universal high pressure hydraulic die casting machine, Model 400-N.

55. Granite Surface Plates

Bryant Chucking Grinder Co., Springfield, Vt. Rock of Ages surface plates.

56. Machine Vise Set

Rockford Engineered Products Co., 2324 23rd Ave., Rockford, Ill. Repco two-piece machine vise set for increasing clamping capacity.

57. Adapters and Extensions

Scully-Jones and Co., 1909 S. Rockwell St., Chicago 8, Ill. Adjustable adapters and spindle extension assemblies.

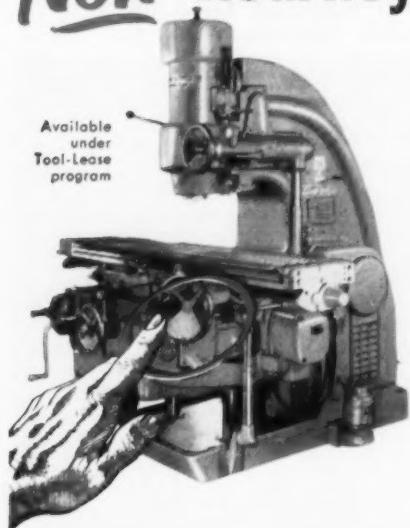
58. Ovens and Furnaces

Blue M Electric Co., 138th and Chatham St., Blue Island, Ill. Electric ovens, furnaces, water and oil baths, humidity cabinets and incubators.

59. Disc Grinders

Besly-Welles Corp., 108 Dearborn Ave., Beloit, Wis. Various types of disc grinders adaptable to unusual grinding jobs.

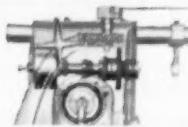
Now Kearney & Trecker has Front-Mounted (convenience-engineered) Handwheel



5 more reasons why **TF** Series milling machines are so easy to operate



Heavier, Wider Knee — Twin Screws support the one-piece, larger knee. Span and length of ways is increased considerably, providing greater saddle support... lasting accuracy... substantial reduction of way and gib wear.



Three-Bearing Spindle — Complete assembly consists of three heavy-duty bearings, flywheel, a train of wide-faced forged steel gears. Rigidity of spindle unit contributes to increased cutter life, quieter operation.



"Vibra-Void" Overarm — Two solid steel bars, mounted through column, void vibration at source, afford more rigidity and resistance to deflection than any other support. Design simplifies changing arbors and cutters.



Twin Screw Knee Support — Exclusive double-support arrangement most effectively distributes weight of machine's heavier knee, saddle and table. Design assures stability and greater accuracy under all cuts.

For more data circle 310 on Reader Service Card

Standard equipment on new
TF Series milling machines...
permits faster table setting...
eliminates costly errors

THE front-mounted table handwheel is a standard feature on all Kearney & Trecker new TF Series, knee-type milling machines—Plain, Universal and Vertical. Mounted on the right front of the saddle and projecting diagonally, the newly positioned handwheel is a part of Kearney & Trecker's up-front central control grouping.

Because table handwheel is ideally located so as to simplify operation of the machine, the operator makes table settings more accurately — in less time and without leaving his normal operating position.

In addition, the new TF's give you a combination of more outstanding design and operating features (illustrated at left) than any other knee-type milling machines. They're built in five sizes — No. 2 to No. 6 from 10hp to 50hp.

For more information, see your nearest Kearney & Trecker representative, or write direct to Kearney & Trecker Corp., 6794 W. National Ave., Milwaukee 14, Wisconsin.

KEARNEY & TRECKER
MILWAUKEE

BUILDERS OF
PRECISION AND PRODUCTION MACHINE TOOLS SINCE 1898



Massive Column — Solid back, double-box section column is scientifically ribbed throughout to rigidly withstand heaviest cutting forces. Full bearing column face affords maximum support for the knee. Cross-mounted motor assures maximum ventilation, easy access for routine inspection.

new literature. (Use reader service cards opposite pages 32 and 372 for free literature.)

60. Throatless Shear

Beverly Shear Mfg. Co., 3000 W. 111th St., Chicago 43, Ill. Electric throatless shear which produces 1,725 strokes per minute.

61. Drill Grinder

Edward Blake Co., Inc., 437 Cherry St., West Newton 65, Mass. Worcester Drill Grinder.

62. Bending Blocks

Acorn Iron & Supply Co., Delaware Ave. and Poplar St., Philadelphia 23, Pa. Bending blocks or welding platens.

63. Production Chuck

Thomas Hoist Co., 28 S. Hoyne, Chicago 12, Ill. Production chuck for use on turrets, engine lathes, cut-off machines, drill presses or any type chucking machine.

64. Chucking Reamers

Twentieth Century Mfg. Co., Box 429 M, Libertyville, Ill. "Supream" Chucking Reamers in decimal sizes.

65. Carbides

Vascoloy-Ramet Corp., 858 S. Market St., Waukegan, Ill. All the facts on V-R carbide products.

66. Mallets and Hammers

Chicago Rawhide Mfg. Co., 1233 Elston Ave., Chicago 22, Ill. Rawhide mallets, hammers and mauls.

67. Inverted-Y Conductors

The Cleveland Crane & Engineering Co., 6462 E. 281 St., Wickliffe, Ohio. Aluminum inverted-Y conductors, supports and collectors.

68. Portable Power Tools

Skil Corp., 5033 Elston Ave., Chicago 30, Ill. More than 100 models of industrial portable power tools, including various accessories.

69. Contour Band Saws

The DoAll Co., Des Plaines, Ill. The Contour-matic Band Machine.

70. Indexing Turntables

Eisler Engineering Co., Inc., 734 S. 13th St., Newark 3, N. J. About 150 various types of indexing turntables, rotating turntables, and angle tables.

71. Spacing Unit

Erickson Tool Co., 2304-11 Hamilton Ave., Cleveland 14, Ohio. The Master Spacer for milling, drilling, inspection, and other operations.

72. Rotary Files and Tools

Easex Rotary File & Tool Corp., 295 Madison Ave., New York 17, N. Y. Hand-made rotary files and tools.

73. Miniature Fasteners

Standard Pressed Steel Co., Jenkintown 22, Pa. Miniaturization in fastening devices.

74. Hydraulic Systems

Sun Oil Co., 1608 Walnut St., Philadelphia 3, Pa. Trouble-shooting chart for hydraulic systems.

75. Presses, Saws and Shears

Famco Machine Co., 3122 Sheridan Rd., Kenosha 26, Wis. Power presses, arbor presses, air presses, drill presses, foot presses, band saws and shears.

76. Self-Tapping Inserts

Groov-Pin Corp., 1135 Hendricks Causeway, Ridgefield, N. J. "Tap-Lok" Self-Tapping Inserts.

77. Grinding Fixture

Harig Mfg. Corp., 5765 W. Howard St., Chicago 31, Ill. "Grind-All" Fixture for precision grinding of perforators.

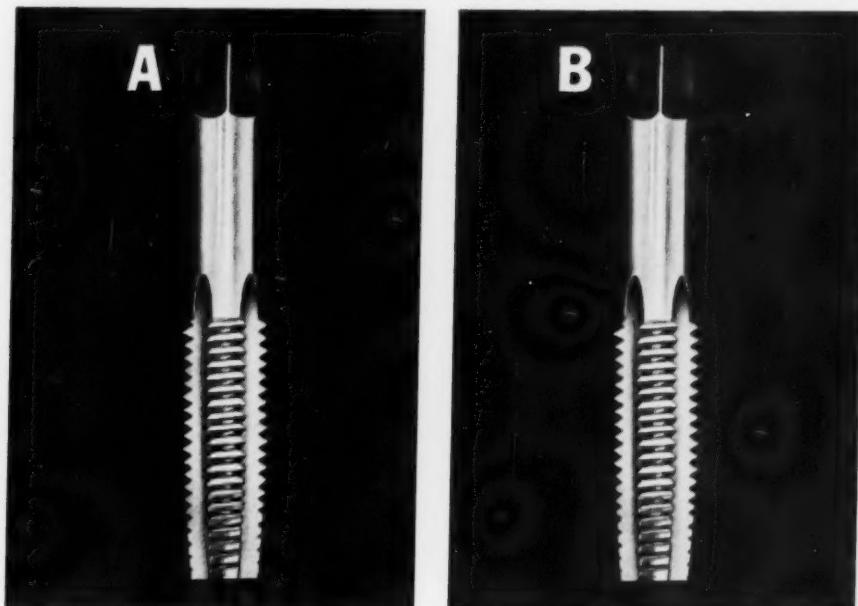
78. Chucks

Horton Chuck, Windsor Locks, Conn. Independent, universal, combination, light-duty and two-jaw chucks.

79. Turret Drilling Machine

Howe & Fant, Inc., 29 Fitch St., East Norwalk, Conn. Turret drilling machine which performs up to six different operations.

WHICH OF THESE TAPS COULD NEVER GET PAST HY-PRO'S ELECTRONIC ANALYZER?



The serious defect in Tap B is invisible. But Hy-Pro's Electronic Analyzer detects all structural flaws for your protection.

HY-PRO's new Electronic Analyzer is one of the three important steps in Hy-Pro's 3-way Quality Control. They are the Electronic Analyzer, advanced Heat Treating and the Micro-Hardness Tester.

Here's how the Electronic Analyzer works. A standard tap, perfect in every detail, is put in one side of the machine. The tap to be tested is put in the other side. Electronic impulses are shot through both taps to analyze

composition, surface condition and internal structure.

The Hy-Pro Electronic Analyzer reveals every defect, including those that laboratory, production tapping and destructive tests fail to uncover!

Get in touch with your nearest Hy-Pro distributor or call us direct. Hy-Pro quality-controlled taps—products of the Tap Specialists—cost no more than ordinary taps.



For more data circle 311 on Reader Service Card

April, 1956 MODERN MACHINE SHOP 164a

"The Tap Specialists"

New Bedford, Massachusetts, U. S. A.

ADDITIONAL WAREHOUSES:

16425 W. MICHIGAND RD. 1193 LAMBERT ST. (WORTH)
DETROIT 21, MICH. CHICAGO 11, ILL.
UNIVERSITY 4-1027 GARDEN 4-0217

105 EDISON PL.
NEWARK 5, N. J.
MARKET 2-4218



It's not always possible to launder all chips or filings out of ordinary wiping material. Chips come back to scar men and metal, to plague your production line. This man has already had 4 wiper cuts.

He had 4 wiper cuts last month



Easy to distribute . . .
always a clean one handy



They really soak up oil . . .
good for solvents, too



When thoroughly used . . .
toss 'em in the trash



Chips can't hide in a clean Scott Wiper. Each Wiper is new, fresh from the carton. A man takes a Scott Wiper as he needs it . . . for his face, his hands, his product.

... He had none!

The difference is . . . Scott Wipers

This is sanitary wiping. A man uses a Scott Wiper thoroughly, throws it away—takes a new one. No danger of cuts from hidden chips . . . no fear of skin infection from dirty wipers . . . when you take a fresh wiper.

With disposable Scott Wipers, handling and distribution are simplified. Laundering, sorting and baling are eliminated.

Your Scott representative or dis-

tributor will demonstrate any time you say. Call him or mail coupon.



Scott Paper Co., Dept. 2-MM
Chester, Pa.
Send information on Scott Wipers.

Name _____

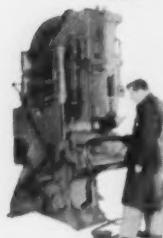
Company _____

Position _____

Address _____

COST-CUTTING SOLUTIONS

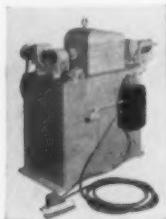
FOR FABRICATORS OF
TUBING, PIPE, MOLDINGS
AND EXTRUDED SHAPES



PINES 20-TON BENDING PRESS—Speeds production of automotive coil pipes, completes some jobs 50% faster by eliminating work handling. Up to 10 bends produced in a single progressive operation, most jobs completed in one handling.



PINES SEMI-AUTOMATIC BENDER—Capacity up to 200 bends per hour, for applications where output does not require speed of fully automatic machines. Hydraulic power assures accurate, highly uniform results. Economically feasible, easy for women to operate, requires up to 60% less floor space.



PINES END-FINISHING MACHINE—3" capacity, floor-mounted unit with air clamping. Speeds deburring, facing, pointing, or light hollow mill turning. Available with manual or air spindle advance. Other units also provided for smaller and larger work.

PINES SIZE 4 BENDER—Now cold forms ultra-thin 4" x .020" stainless steel tubes for aircraft to 8" x 1 radius. Ability to form these sharp, small radius bends without wrinkles saved \$14,000 per plane for an aircraft manufacturer.

● Since 1941, when Pines Automatic Hydraulic Bending Machines were first introduced, more and more plants fabricating tubing, pipe, rods, moldings, rolled and extruded shapes, have found it profitable to standardize on Pines Machines. Dependable accuracy, combined with fast, more efficient operation are two of the major reasons why hundreds of commercial and industrial plants have turned to Pines to find cost-cutting solutions to bending and end-finishing problems. A study of the four examples shown here may suggest how you may profitably take advantage of the latest developments in fabricating the "Pines-way".

WRITE FOR *Free Data Sheets*

For additional cost-cutting ideas, write today for free copies of "Pines News"—illustrates latest bending and end-finishing techniques applied to actual jobs. And call on Pines engineers for assistance on any job.



PINES ENGINEERING CO., INC.
Specialists in Tube Fabricating Machinery 643 WALNUT • AURORA, ILLINOIS

PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY

For more data circle 314 on Reader Service Card

There's an EX-CELL-O

Precision Spindle

BUILT ESPECIALLY
FOR YOUR WORK

25 hp heavy duty precision spindle
with 24" grinding wheel.

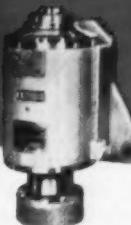


Totally enclosed Inbulli motor surface grinder spindle.

Precision Inbulli
motor spindle for
cutter grinder.

25,000 rpm high frequency
Inbulli motor spindle.

Heavy duty motorized
precision spindle
available up to 20 hp.



For production grinding to precision limits "just any spindle" won't do. It must be carefully selected to suit the work. From Ex-Cell-O's widely-varied line of precision spindles you can select a standard model, or we'll make one special to your requirements. These spindles have long been the original equipment choice of leading manufacturers.

Features of the line include:

- Rigidity
- Permanent adjustment
- No vibration, no chatter
- Precision ball bearings preloaded for predetermined speeds

Phone your Ex-Cell-O representative, or phone or write Ex-Cell-O in Detroit, for CATALOG LISTING HUNDREDS OF STANDARD GRINDING SPINDLES

56-36

EX-CELL-O High-frequency Spindle, rated at
40,000 rpm, grinds small holes in bushings.



MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING
SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS
DRILL RIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUC-
TION PARTS • DAIRY EQUIPMENT

EX-CELL-O
CORPORATION
DETROIT 32, MICHIGAN

For more data circle 315 on Reader Service Card

Limiting Productive Capacity

A Guest Editorial

By GEORGE S. BENSON

Director—National Education Program,
Searcy, Arkansas

An Associated Press dispatch notes that 14-year-old George Wright II, who won \$100,000 on the television quiz program "The Big Surprise," would normally owe \$75,000 of it in income tax under existing laws. But there is a way, the boy's father says, through which George may be able to keep a little more than \$25,000. Through a legal maneuver the boy may become the "head of the family" and claim his mother, brother and sister as his dependents. Lawyers figured this one out and apparently they are still searching for other maneuvers which might aid the tax-stricken boy.

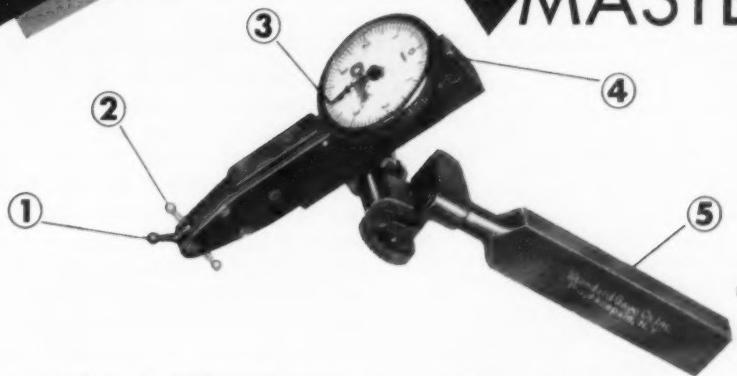
But all agree that even with recourse to all legal maneuvers, young George will not be able to salvage more than a few extra thousand above the \$25,000. This is a ridiculous situation—through no fault of the boy—even though the money was not earned in the normal sense. A 75 per cent tax on income is ridiculous. And it is much worse in the still higher brackets of income.

For instance, the president of a certain large manufacturing plant, whose production genius has provided constantly better jobs for nearly 10,000 employees, is worth more than \$100,000 a year to his company on the basis of comparative salaries throughout the business and professional world. But he doesn't make \$100,000 a year. Here is the shocker: This man's salary is \$575,000 a year. The Federal government takes in taxes \$156,820 of the first \$200,000. On the remaining \$375,000 the government then levies a 91 per cent tax. Thus from this one man—working for a salary—the government takes \$498,070 as its first mouthful.

That's just the Federal government's income tax. On top of this, state income taxes must be paid. And out of every expenditure the man makes with the money he retains, still other direct and indirect taxes are paid. The Federal income tax alone cuts his \$575,000 salary to about \$76,000; and when the other state and Federal taxes are extracted,

ANNOUNCING

the **CHECKMASTER**



PATENT
PENDING

AN ALL NEW TEST INDICATOR

by **STANDARD**

- ① Light contact pressure (15 grams standard), uniform for both directions of contact point.
- ② Contact positions over full 180 degree arc. Points interchangeable.
- ③ Clockwise movement of hand for both directions of contact point. Directional reverse-lever eliminated.
- ④ Indicator graduated to .0001", range .008"—unusually sensitive, responding to dimensional variations of .000020".
- ⑤ Exceptionally versatile mounting holder.

WRITE FOR DESCRIPTIVE BULLETIN

STANDARD GAGE COMPANY, INC.
MEASURING INSTRUMENTS FOR PRECISION INDUSTRY
94 PARKER AVE. POUGHKEEPSIE, N. Y.



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for . . .
PRODUCTION SOLDERING

Handles numerous soldering jobs from fine precision to medium-heavy industrial. More than 16 styles of electrode holders to fit individual soft or hard soldering operations.

From 6 to 30 stages of heat with a selector switch used in conjunction with 3 secondary terminals.

A wide range of power—5 to 2500 watts—quickly supplies concentrated heat at exact area—insures perfectly soldered joints with maximum Speed, Safety, Flexibility and Economy.



for . . .
ETCHING & DEMAGNETIZING

Marks the hardest steel, stainless steel, steel alloys or carbides with the ease and legibility of a pencil. 4 types of interchangeable marking points available to serve every purpose. 6 to 36 distinct marking heats. Easy to operate. Two tools in one. Demagnetizes over a 4 to 8-inch width. Especially valuable when tools have been in contact with magnetic chuck.

Write for New Catalog descriptive of all model Solder Tools, Etch-tools, Demagnetizers . . . today.



**THE LUMA
ELECTRIC
EQUIPMENT CO.**

P.O. Box 132-MS • Toledo, Ohio
For more data circle 317 on Reader Service Card

Limiting Productive Capacity . . .

the net income is considerably lower.

The situations that are created by our ridiculous tax structure are so fantastic that actually in some cases people are better off financially if they refuse to accept a raise in salary or if they carefully limit their earning capacity—their productive capacity. And herein lies one of the many dangers in our tax structure.

A number of people within my acquaintance—not big producers; but ordinary small business operators—have come to the point where normally their business should expand. Additional investment of savings, or even borrowing, would be necessary. In some cases the decision was not to expand. This blacked out quite a number of jobs which would have been created in the expansion. It also had the effect of holding back progress which would have directly and indirectly improved the welfare of all citizens. Some changes are in order in our tax structure.



"This, of course, is our drafting room."

New working flexibility! New ease of handling
... even on toughest, hard-to-reach jobs!

MODEL 75 **1/4" SKIL DRILL**

WITH HIGH-TORQUE KEYLESS CHUCK



Model 75 Drill, \$49.50
with Keyless Chuck, \$54.25

Speeds bit changing, ends key fumbling! Famous Model 75 Drill now offers fresh working advantages with high-torque keyless chuck. Gripping power is even greater than with a keyed chuck! Highest accuracy, fine balance, and fast bit changing. Tightens by hand—no more keys to lose.

**Other Important Features
That Make SKIL Model 75
Your Best Drill Buy!**

- 55% more powerful, yet lighter in weight than other drills!
- Choice of 7 speeds (500 to 5,000 r.p.m.).
- Handy, safety-designed trigger lock for continuous operation—side location for easy use.
- All anti-friction bearings for longer drill life.
- Large inspection plate for routine maintenance.
- Comfortable "contour-grip" handle.

When You Buy A Drill, Be Sure It's A SKIL!

For more data circle 318 on Reader Service Card

FREE!

Let your SKIL Distributor prove SKIL superiority with a demonstration and FREE trial. For information and literature, write:

SKIL Corporation, Dept. MMS-46
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SKIL
PORTABLE TOOLS

Made only by SKIL Corporation
Formerly SKILSAW Inc.
5033 Elston Avenue, Chicago 30, Illinois
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Factory Branches in All Leading Cities

news of the industry

New plants and expansions . . . company name changes . . . exhibitions . . . new appointments . . . awards.

PRECISE PRODUCTS PLANS MOVE TO NEW ULTRA-MODERN PLANT

Precise Products Corporation recently announced plans to move into a new ultra-modern plant located on Blue River Road, Racine, Wisconsin. The new plant has over 15,000 square feet of floor space. According to Helmut W. Schumann, executive vice president of the company, the expanded facilities will permit a 100 per cent production increase of its widely-known line of high-speed, portable electric power quills, grinder-millers, machine tools, rotary tools and accessories. The plant

is a one-story brick building, with executive offices located on a mezzanine which overlooks both the business offices and plant. Provisions for air conditioning have been made to serve both the plant and the general offices.

★ ★ *

T. R. ALMOND MANUFACTURING COMPANY CHANGES NAME

Announcement was made recently of the change in name of the T. R. Almond Mfg. Co., Willoughby, Ohio, to Kennametal Company of Ohio. The Almond firm was acquired several



Wash drawing of new ultra-modern plant of Precise Products Corporation, Racine, Wisconsin

months ago by Kennametal Inc., Latrobe, Pa., and is being operated as a wholly-owned subsidiary. Officers of Kennametal Company of Ohio are Philip M. McKenna, president; Alex G. McKenna, vice president; George J. Heideman, treasurer; Charles R. Van Norden, secretary and Richard J. Flickinger, assistant secretary. These officers, all officials of Kennametal Inc., together with Gilbert A. Bunn, also of Latrobe, comprise the board of directors. Mark A. Rollinson, who has been associated with Kennametal Inc., Detroit Division, has been appointed plant manager.

The former Almond Plant has been equipped to produce the Kennametal line of mechanically-held tools. It has been announced that production, already begun on a limited scale, will be increased as rapidly as conditions permit. The downtown Cleveland sales office of Kennametal Inc. has been moved to the new plant, which will also serve as a major warehousing and shipping point for the complete line of Kennametal tools and inserts. The parent company is a major manufacturer of cemented hard

carbide compositions, tools for the metalworking, mining, woodworking and construction industries; also wear-resistant parts.

★ ★ ★

MAXWELL COMPANY MOVES TO NEW FACTORY AND OFFICES

The Maxwell Company, formerly of Bedford, Ohio, has announced its removal to a new factory with larger offices and increased manufacturing fa-



For automatic setup.



For semi-automatic setup.



For semi-automatic setup.

Heads... You Win!

U. S. DRILL HEADS, THAT IS!

Regardless of the size of your shop, if you have high production jobs, you'll find an extraordinary reduction in tooling and manufacturing costs when you use U. S. Drill Head.

The heads shown here, moderate in cost, are for use with automatic chucking machines and turret lathes, for drilling or tapping operations. They provide, in most cases, that a part can be completely finished in one handling.



Manufacturers of all types of adjustable, fixed center and individual lead screw tapping heads.



For more data circle 319 on Reader Service Card

news of the industry . . .

cilities at Macedonia, Ohio. H. S. Reddig, owner, states that the new factory, fully and modernly equipped, was made necessary to take care of the increased demand for Maxwell products and the need for improved facilities and better service to customers. The company products include Hutto Ad-

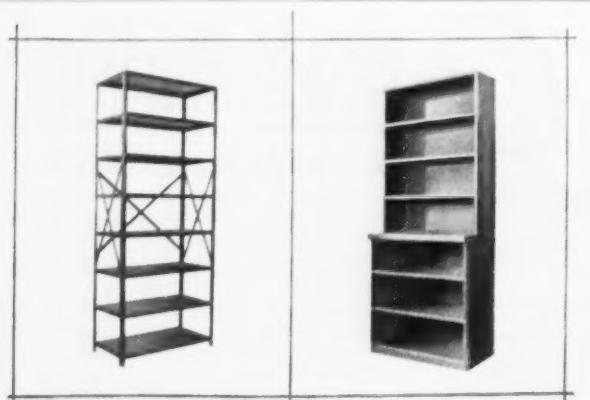
justable Boregages, precision boring heads, boring and reaming tools and automatic recessing tools.

★ ★ ★

INTERNATIONAL MACHINE TOOL EXHIBITION

The International Machine Tool Exhibition is scheduled to be held in Olympia, London, from June 22 to July

6, 1956, Sundays excepted. Organized by the Machine Tool Trades Association (of Great Britain), the exhibition will maintain the four-year cycle which has proved to be the most suitable for the industry in general, and will be the largest and most comprehensive show of its kind ever to be staged in Great Britain. The exhibits will include metalworking machine tools and woodworking machinery, engineers' small tools, gages and measuring equipment, testing equipment, presses and power hammers and heat treatment units. It will provide a notable opportunity to study and compare at first hand the tools and equipment manufactured by



HALLOWELL *adjustable shelving*

Build efficient, custom-designed storage facilities with standard HALLOWELL shelving units. Made of prime cold-rolled steel—multiple pierced and precision formed for easy assembly and complete interchangeability—phosphate coated and finished in gray or green baked-on enamel. Ledge type, counter type, or vertical type units. Shelf sizes from 24 by 12 to 48 by 36 in., heights from 39 in. to 10 ft. 3 in. See your industrial distributor for details. Or write Hallowell Shop Equipment Division, STANDARD PRESSED STEEL Co., Jenkintown 22, Pa.

STANDARD PRESSED STEEL CO.

HALLOWELL SHOP EQUIPMENT DIVISION

SPS

JENKINTOWN PENNSYLVANIA

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Harig

is proud to serve
the great name of

ELGIN

Harig is proud to serve the great name of Elgin—long one of the giants of the watchmaking industry.

We take great pride in supplying an industry which sets the strictest standards of accuracy and precision.

The same high purpose and skill which goes into the Elgin product, is also built into every Harig die, tool or custom piece of machinery.

If you have a special requirement, take advantage of Harig's 20 years of experience and engineering qualifications.

We will be glad to recommend and estimate on any tooling problem. There is no obligation.

HARIG makes America's finest

- CARBIDE DIES
- LAMINATION DIES
- PROGRESSIVE DIES
- BLANKING DIES
- PERFORATOR GRINDING ATTACHMENT
- DRAW DIES
- MOLDING DIES
- JIGS AND FIXTURES
- SPECIALTY MACHINES



5765 W. HOWARD STREET, CHICAGO 31, ILL.

news of the industry . . .

leading manufacturers of the world.

Truly international in scope, the show will include exhibits from leading firms in Belgium, France, Germany, Holland, Italy, the Scandinavian countries, Switzerland and the United States, in addition to those of British manufacture. Further details concern-

ing the exhibition may be obtained from The Machine Tool Trades Association, Victoria House, Southampton Row, London, W. C. 1.

★ ★ ★

GIDDINGS & LEWIS REORGANIZES OVERALL COMPANY

The reorganization of the Giddings & Lewis Machine Tool Co., Fond du

Lac, Wis., into a divisional-type company has been announced by Ralph J. Kraut, president of the company. Giddings & Lewis will operate four divisions under the new arrangement. Two divisions, the G & L HYPRO and the Davis Boring Tool Divisions are located in Fond du Lac. The former Cincinnati Bickford Tool Company will be operated in Cincinnati under the name of the Cincinnati Bickford Division. The Kaukauna (Wisconsin) Machine Corporation will be known as the Kaukauna Machine & Foundry Division.

Each of the four divisions will be operated as a separate unit under a general manager. The general manager of the

900 pounds of magnetic grip at the click of a switch

Note how easily magnet supports weight of man seated at end of shaft.

Stearns drill stand magnet grips flat steel surfaces with 900 pounds of positive holding force — eliminates time-wasting mechanical clamps. Switch current on, you're ready to work — switch it off, you're ready to move. With this magnet holding the stand you can drill, ream, tap, saw holes, run nuts, etc., from any position — horizontally, vertically, upside down at various angles.

This unit provides full visibility of work; quick, accurate line-up; safe, secure holding. Magnet is 8½ inches in diameter, weighs only 54 lb.



Four Models of Lifting-Holding Magnets

Stearns also builds highly portable magnets for lifting steel blocks or slabs from floor to machine tools . . . holding sheets together for tack welding — a wide variety of lifting or holding jobs. Eliminates slings, hooks, clamps. Continuous or intermittent duty, 7-in. to 15-in. diameter. Write for bulletin 135-D. 1120

MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS



MAGNETS

STEARNS MAGNETIC, INC., 664 S. 28th St., Milwaukee 46, Wis.

For more data circle 322 on Reader Service Card

news of the industry . . .

divisions are Edgar L. McFerren, vice president and general manager of the G & L HYPRO Division; Allan L. McKay, vice president and general manager, Cincinnati Bickford Division; Erich C. Wussow, vice president and general manager, Kaufman Machine & Foundry Division; and Erwin J. Kaiser, general manager, Davis Boring Tool Division.

Two new board of directors were chosen. Mr. McFerren, formerly vice president of engineering at Giddings & Lewis, and Mr. McKay, formerly president and general manager of Kaukauna Machine Corporation, were named to the board.

Two other board members who have retired, J. Roy Porter and Keith F.



(Top) E. L. McFerren (left) and A. L. McKay.
(Bottom) E. C. Wussow (left) and E. J. Kaiser

**LIVE CENTER
ACTION WITH
DEAD CENTER
ACCURACY**

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**ANTI-SCORING
LUBRICANTS**

**Anti Scoring
Center Point Lubricant**

Downsides A CS

**PROVE IT TO
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DOLLAR AND THIS COUPON!**

Free-running on dead centers—with COMPLETE protection, CMD Lubricants are CONCENTRATED, form a "tough" film—absolutely NO GALLING or SEIZING—under the heaviest load. STABILIZED for added "oiliness" giving longer, smoother runs without slip-stick action. It all adds up to LIVE CENTER ACTION with DEAD CENTER PRECISION. The bigger the job, the better you'll like it.

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TWO FOUR OZ. TUBES \$1.00**

Send me my order of CMD right away!
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YOUR TURNING-TIME CONCEPTS

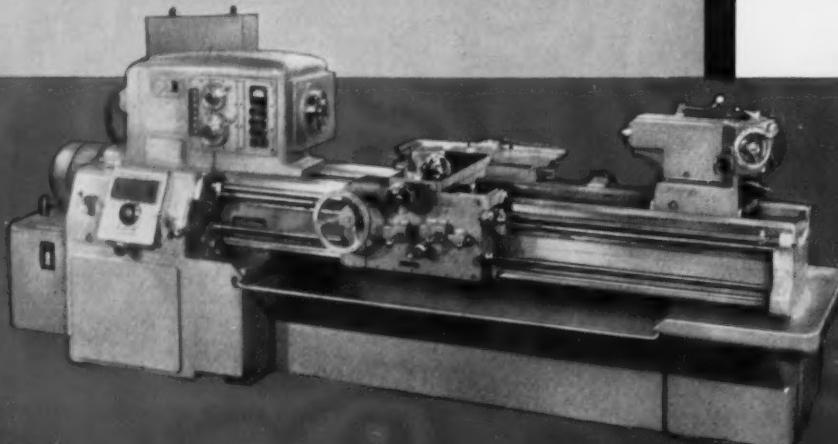
Set it—forget it! That's the story of the Preselector Dyna-Shift. It's the brain Monarch has built into the new Series 62. With it *this* machine will give a greater ratio of metal removing hours to work hours than you ever dreamed possible.

When setting up, merely dial the surface speed wanted and the first diameter to be turned—the Dyna-Shift computes the R.P.M. and makes the shift instantaneously and automatically. (*Time-saver #1*). Then, to maintain this surface speed on successive diameters, set the work diameter selectors. Every speed change thereafter, on every piece in the run, takes place automatically with but one fast dial setting and movement of the work start and stop lever. (*Time-saver #2*). What's more, here at last is the lathe with a speed range so wide as

to take care of all your needs. Its 20 H.P. drive gives you 36 different spindle speeds in a range from 14 to 1750 R.P.M., a ratio of 1 to 125. (*Time-saver #3*).

Nor are the time-saving features of the Series 62 limited to the Preselector Dyna-Shift headstock. There's four-way power rapid traverse which cuts tool positioning time on the average of 50%. There's the totally enclosed and automatically lubricated gear box and end gearing. There's a completely new two speed tailstock. Add them all up and you get a new lathe concept that means Production with a capital P!

You will want to know all about these and many other features in detail. Send the coupon for the greatest turning news in years!! . . . The **Monarch Machine Tool Company, Sidney, Ohio.**



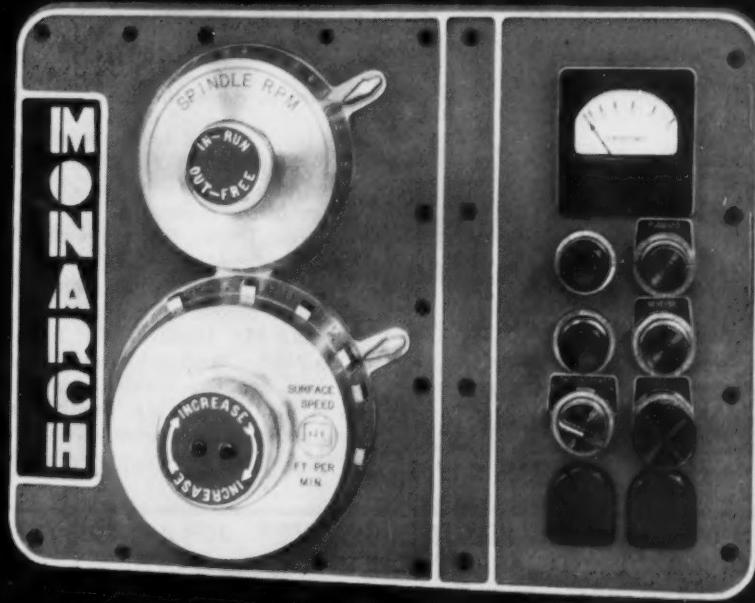
THE NEW MONARCH SERIES 62 PRESELECTOR DYNASHIFT LATHE

Models 130 and 1130 (above)—13" swing over cross slide, 20" clearance diameter.

Models 131 and 1131—16" swing over cross slide, 24" clearance diameter.

S ARE IN FOR A SHOCK!

See the New Monarch Series 62 Preselector Dyna-Shift
—Unequaled for Speed and Ease



**FILL OUT COUPON—and
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letterhead, please →**

Monarch
TURNING MACHINES

FOR A GOOD TURN FASTER
... TURN TO MONARCH

**THE MONARCH MACHINE TOOL COMPANY,
Sidney, Ohio**

Gentlemen:

- I am interested in your Series 62 story.
Please send me your illustrated Booklet
#1501 with complete data.
- Please have a Monarch sales engineer
call on me.

NAME _____ TITLE _____

COMPANY _____

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CITY _____ ZONE _____ STATE _____

news of the industry . . .

Gallimore, will be retained by Giddings & Lewis in an advisory capacity.

★ ★ ★

**E. W. BLISS COMPANY ELECTS
H. U. HERRICK BOARD
CHAIRMAN**

Howard U. Herrick, formerly president of E. W. Bliss Co., Canton, Ohio,



Howard U. Herrick (left) and Robert Potter

has been elected to the newly-created office of chairman of the board in which position he will serve as chief policy officer of the company.

Robert Potter, formerly an executive vice president of the company, was elected president and chief administrative officer of the company, succeeding Mr. Herrick. Mr. Potter was also elected a director and a member of the executive committee, succeeding J. H. Tredinnick. Mr. Tredinnick, who has resigned as an executive vice president, director and member of the execu-

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A SPECIALIZED CAM MILLING SERVICE.
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QUICKEST AND EASIEST SETTING TOOLS ON THE MARKET**

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Diamond \$7.00

ANGLE DRESSER \$49.00

ORDER DIRECT
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money back
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Chatter Resistant, Spring Loaded Spindle

Hardened shaft—bearing adjustable for wear.
Diamond always perfectly centered.
Easily set adjustable 180° stops.

10" Wheel size for DoALL and NORTON
Grinders—\$49.00. Diamond \$7.00.

SPECIAL 20" Wheel Size \$110.00.

The "Mighty Midget" Line

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Ball Thrust Bearing.
24 Precision Ground Surfaces. Can be set
very accurately with a Protractor or
Sine Bar. Works underneath the wheel.
Large bearing surfaces.

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New! A cooler, smoother running, more flexible production hand tool!

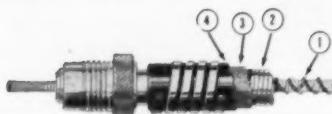


Many new

features

make DUMORE'S

Super-Flex industry's finest flexible shaft tool!



What makes the Super-Flex Better?

Encircling the shaft is a bronze liner (1) which acts as a bearing and confines rotation within a definite radius. It prevents vibration, whipping and acts as lubricant to the shaft. The armored wire casing (2) is surrounded by wire braid (3) for further insulation and covered with neoprene (4) which is oil, grease and water resistant. Handpiece housing is precision bored. Super precision bearings are seated on hardened, accurately ground spindle. Weight 14 oz. Speed 22,000 rpm. Wheel capacity up to 1" with 1/4" shank; up to 3/8" x 1" carbide burrs.

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AUTOMATIC DRILL UNITS
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news of the industry . . .

tive committee, will remain as a vice president and as a consultant to the president.

★ ★ ★

WELDING PROGRESS AWARDS

The James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio, is of-

ferring \$20,000 in cash awards for ideas or suggestions that will accelerate progress in arc welding. Residents of the United States and its possessions are invited to submit ideas to the foundation on any aspect of arc welding that can be used to advance welded design, welding engineering or the general application of the arc welding process. No restrictions are placed on either the nature or the extent of ideas that may be submitted. The \$20,000 will be distributed in 20 awards with a top award of \$5,000 and others of 4, 3, 2 and 1 thousand dollars, in addition to smaller awards. Ideas must be submitted by July 30, 1956.

Complete information and rules are available from The James F. Lincoln Welding Foundation, Cleveland 17, Ohio.

★ ★ ★



Priced from \$190.00

TORIT units trap dust at source! save money!

You can move and install Torit dust collectors yourself. We'll engineer your toughest dust problem and also check the installation. Torit units are usually more efficient and money-saving than central (built-into-the-building) systems. Torit units operate only when machines they protect are in use. Filtered air may be returned to room to save heat. Many models and sizes, all self-contained, easy to move. Write today to . . .



TORIT MANUFACTURING CO.

Dept. 702, 296 Walnut St., St. Paul 2, Minn.

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DEARBORN ENTERS AIR GAGING FIELD

The formation of a new Air Gaging Division to manufacture and market its recently developed column-type air gaging instruments and elements has been announced by Dearborn Gage Co., Dearborn, Mich. The new instruments, to



Wilson "Rockwell"® Hardness Testers

Production Line Speeds with Laboratory Accuracy

- There is a WILSON "ROCKWELL" Hardness Tester to meet every requirement—from laboratory testing to automatic testing at the rate of 1000 pieces per hour.

J Model Manually operated ▶

Supplied in both NORMAL and SUPERFICIAL testing types. Designed for testing tools, machine parts and all ferrous and non-ferrous metals, hard or soft, except thin sheet steel.



◀ Y Model Motorized

Suitable for testing work now being done with J models when it is advisable to increase testing speed. Motorized mechanism removes the major load in the test cycle. Set-O-Matic Dial Gauge eliminates need of manually setting dial gauge to zero.



A WILSON hardness testing expert is located near you. Save time and money on your Testing problems. Write or call today.

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WILSON "ROCKWELL"...

the world's standard of hardness accuracy

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Wilson Mechanical Instrument Division
AMERICAN CHAIN & CABLE

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for
Better
Value

news of the industry . . .

be marketed under the trade name "Dearbornaire," will be offered in three standard amplifications for single or multiple column air gaging applications and will incorporate several major design and engineering improvements. Among the new features specifically mentioned are a high rated self-cleaning pressure system, an improved glass

tube design, "zero-centered" calibrated scales, interchangeable component parts and simplified two-step conversion from one amplification to another.

★ ★ ★

NOBLEWEST CELEBRATES 50TH ANNIVERSARY

The Noble & Westbrook Mfg. Co., East Hartford, Conn., one of the country's leading manufacturers of production metal marking equipment, is celebrating its 50th anniversary this year. Founded on March 12, 1906, by the late George Westbrook and Richard H. Noble, the firm began operations by manufacturing steel stamps. Under three generations of the same ownership, Noblewest has made many contributions toward the development of faster, better marking.

Products manufactured by Noble & Westbrook include roll marking equipment, dial-type rapid production marking machines, precision graduating equipment, automatic and non-automatic numbering heads, precision marking dies, nameplate presses, air mark-

2
Seconds

CAN SAVE YOU TWO HOURS!

Adjusting bevel gear mesh with a laminated shim is a matter of two seconds to remove a lamination!

The shim in this case is made of LAMINUM®, our exclusive material. It is a "solid" unit built up of 16 layers of .002 brass. It peels quickly and easily. Each shim removed adjusts the bevel gear position by two thousandths.

You save time by easier machining tolerances on the housing; you save time by eliminating pesky assembly machining; you save by not tying up a machine intermittently. IT'S EASIER!

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Check Our Stamping Division
For Your Stamped Parts Requirements

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182 modern machine shop



April, 1956



Here's why Blanchard Wheels are best for Blanchard grinding

Almost thirty years ago, Blanchard began developing and manufacturing better grinding wheels for Blanchard Surface Grinders. Our research first produced silicate bonded wheels, and then resinoid bonded wheels.

Today, Blanchard offers silicate, resinoid and vitrified bonded wheels . . . scientifically manufactured and accurately graded in our modern wheel plant.

Use Blanchard Wheels on your Blanchard Grinders. The correct wheel gives you peak production and economy on each job . . . whether the work is tough as copper or fragile as glass, whether it requires heavy roughing cuts or precision grinding within .000010" of absolute flatness and surface finish of 1 micro-inch.

THE BLANCHARD MACHINE COMPANY 64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.

PUT IT ON THE 
BLANCHARD

64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.

THE BLANCHARD MACHINE COMPANY 64 State St., Cambridge 39, Mass.

MMS

Please send "The Art of Blanchard Surface Grinding" (3rd Ed.)

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news of the industry . . .

ing presses, bench model marking machines, interchangeable steel type and hand marking tools.



MANAGEMENT COURSE

The College of Engineering, State University of Iowa, has announced the

seventeenth management course to be held June 11 through June 23 in Iowa City. Since its inception, over 1,200 representatives of American and foreign business, industrial and governmental organizations have increased their understanding of the design and application of the major management techniques through attendance of the course.

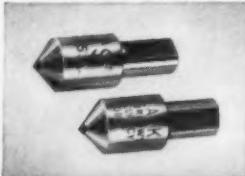
To the intensive course of instruction is added a series of talks by recognized authorities on new developments, applications and problems in management techniques. The entire program is designed for those who have need to use these techniques — factory managers, foremen, industrial engineers, methods and time-study analysts, cost men, office executives and others in related work. The areas of production planning, job evaluation, motion and time study, wage incentives, plant layout, materials handling, quality control, supervisory training, labor relations and legislation, organization and policy, engineering economic analysis and public speaking are included. The regular State University of Iowa

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for All Your "Rockwell Testing" Needs

CLARK Diamond Cone Penetrators are exactly right for your "Rockwell" hardness tester, whether or not it bears the CLARK name. Every step in their manufacture, from careful diamond selection to expert lapping, leads to a precision product that will give you precision results. Yet CLARK Diamond Penetrators cost surprisingly little.



CLARK Steel Ball Penetrators, for accurate "Rockwell testing" of unhardened steel, cast iron, brass, bronze, and similar materials, are available in all standard sizes.



CLARK Test Blocks, in various hardness grades, provide a quick, sure, and simple method of checking the accuracy of your "Rockwell" type hardness tester.



Write today for descriptions and prices.

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Abrasive Cutting

the best way to cut many materials
the only way to cut some

Allison Cut-Off Wheels

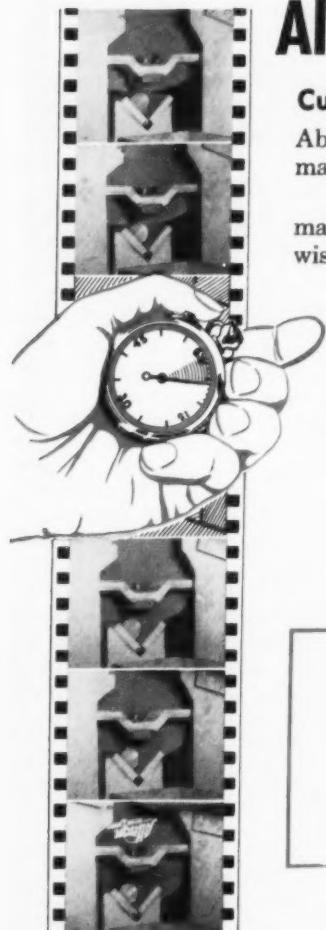
Cut 1½" Bar Stock in 6 seconds

Abrasive wheel cutting is faster than sawing. In many cases it is ten to twenty times as fast.

An abrasive wheel will cut the hardest materials with ease. No need to anneal or otherwise prepare material for cutting.

A properly selected abrasive wheel leaves a finish which requires little, if any, "cleaning up" operations.

At the left an ALLISON Abrasive Cutting Wheel is shown cutting 1½" bar stock in 6 seconds per cut.



Allison
ABRASIVE CUTTING WHEELS

It pays to consult a specialist...

Profitable abrasive cutting means the right abrasive wheel...and the proper abrasive cut-off machine...for the specific job. Why not let an ALLISON abrasive cutting specialist check your hardest cutting job?

Send for Booklet
"ABRASIVE CUTTING"
today



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ALLISON DIVISION
AMERICAN CHAIN & CABLE

TRADE
MARK

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For more data circle 334 on Reader Service Card

April, 1956

modern machine shop 185

4 Reasons why you should use **GAMMONS DIE REAMERS**



Specially treated for
today's modern die
steels.



Rapid cutting capacity.



Tapers per inch .005,
-.008, -.013 in stock.



Large range of stand-
ard sizes in stock at all
times for your conveni-
ence.

WRITE FOR
COMPLETE INFORMATION

GAMMONS • HOAGLUND CO.

MANCHESTER 2, CONN.
Manufacturers of helical taper pins, chucking,
die makers and special reamers.

For more data circle 335 on Reader Service Card

186 modern machine shop

news of the industry . . .

teaching staff will be augmented by outstanding men from a variety of industries and other educational institutions.

Communications concerning the course should be sent to J. Wayne Deegan, 122 Engineering Building, State University of Iowa, Iowa City, Iowa.

* * *

ECLIPSE COUNTERBORE ACQUIRES WADELL TOOLS

Eclipse Counterbore Co., Detroit, Mich., has acquired the land, factory building, machinery, inventory and patent applications of Wadell Tools, located at North Branch, New Jersey. Manufacturer of precision cutting tools for over 40 years, Eclipse specializes in interchangeable carbide and high speed counterbores, countersinks, core drills and back-spotfacers. The addition of the line of precision end mills, produced by Wadell, augments the Eclipse line.

R. G. Michell, Eclipse president, states that production of this new addition will continue uninterrupted at its completely-equipped North Branch plant, under the supervision of Ray A. Parent. All operations of both Eclipse plants are under the direct management of Herbert R. White, vice president and general manager.

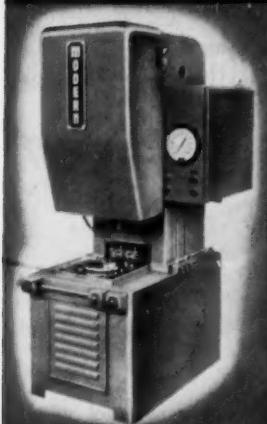
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"MARVEL" SAW PLANT EXPANDS

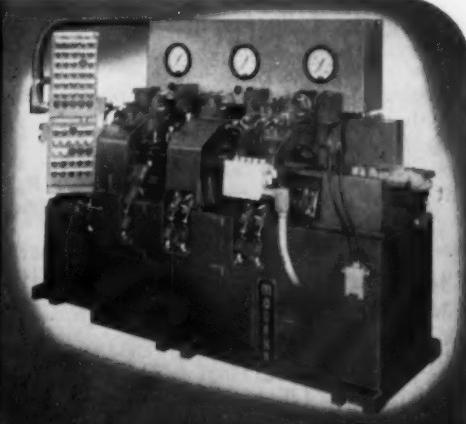
Armstrong-Blum Mfg. Co., Chicago, Ill., producer of "Marvel" products, has expanded its manufacturing operations by the recent purchase of an adjoining plant, which will approximately double the manufacturing floor space and appreciably increase the office, laboratory

April, 1956

Production Pressure Test for **AUTOMOTIVE** **AIRCRAFT** **APPLIANCE** and **FARM** **EQUIPMENT** *Industries*



Model MPT-I unit for transmission converter housings



Transfer unit checks 133 manifolds per hour.

Here are a few features of
Modern pressure test units
now in service:

- Fully automatic transfer line operation testing three separate manifold passages including marking of O.K. parts. Defectives are automatically color coded to show reason for rejection and shuttled to rework station.
- Semi-automatic checking of transmission converter and end housings including stamping of O.K. parts. Production up to 58 parts per hour.
- Semi-automatic inspection of cylinder heads including automatic "dunking" of defective parts to locate leaks.

Ask for literature describing Modern's pressure test units.

14230 BIRWOOD AVE.

MODERN
Industrial Engineering Co.

DETROIT 38, MICHIGAN

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news of the industry . . .

and research areas. The present plant and the newly-acquired building are being connected as a single ground-floor plant, with no interference to current production and customer service.

★ ★ ★

SCHMARJE CHANGES COMPANY NAME

In its 15th year of operation, Schmarje Tool and Engineering Co., Muscatine, Iowa, has changed its name to Schmarje Tool Company, according to Clarence F. Schmarje, president. In addition, Schmarje has expanded sales operations and plant facilities. Additional equipment recently purchased and installed includes an ultrasonic machine tool for making shaped holes or impressions in carbide, ceramics,

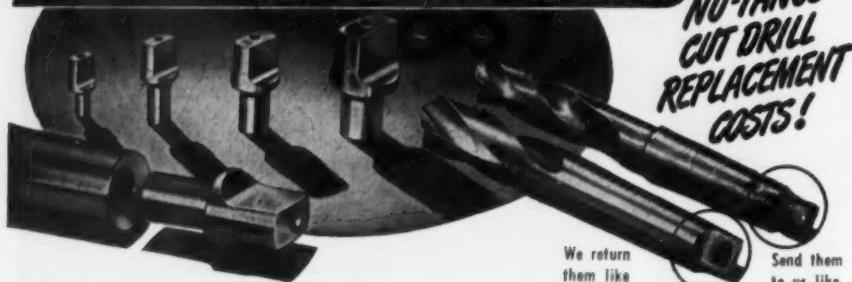
glass and other hard or brittle materials which cannot be worked by other methods. This machine is the only one of its kind in the Midwest.

★ ★ ★

R. G. HASKINS COMPANY ACQUIRES N. A. STRAND

G. R. Haskins, president of R. G. Haskins Co., Chicago 12, Ill., has announced the purchase of the N. A. Strand Division of Franklin Balmar Corporation. N. A. Strand has been identified with the manufacture and sale of equipment similar to the Haskins' line and, as a new Haskins division, will continue to serve its customers as a wholly owned, independently operated subsidiary. E. P. Grismer has been appointed general manager of N. A. Strand Flexible Shaft, Inc. He will continue as chairman of the board of R. G. Haskins Company.

NEW DRILLS FROM OLD WITH NU-TANGS



Send us your old drills—we'll make them new again at a fraction of the cost of a new drill! Exclusive NU-TANG® process replaces twisted or broken tangs with brand new tangs of correct size—and with GUARANTEED ORIGINAL STRENGTH. No welding—No distortion—No shortening of drills—No sleeves.

We return
them like
this!

Send them
to us like
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Any drill, reamer, or other tool with a Morse taper in sizes 2 to 6 can be repaired perfectly this quick new way. Delivery—One week. Used by many leading industrial plants. Amazingly low cost—satisfaction guaranteed! Send for complete information.

* Patent No. 2,512,033

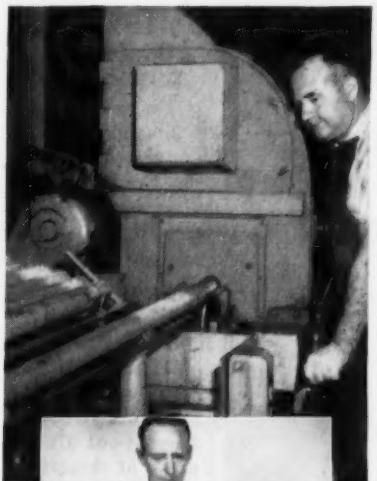
NU-TANGS INC. 1339 Bates Street
Cincinnati 25, Ohio

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today

Abrasive Cutting | the best way to cut many materials the only way to cut some

Campbell Cut-Off Machines



- Cutting 20-foot tubes of stainless steel into 1" to 17" lengths
- Tube lengths cut accurate to .002"

Let us send you
this book



Slice \$32,000 a year from tube cutting costs

Because CAMPBELL Abrasive Cut-Off Machines not only cut stainless steel tubes twice as fast as former methods—but the clean cut saves a de-burring process—Ryan Aeronautical Company saved \$32,000 the first year of operation.

The smooth-finish cut of the CAMPBELL Oscillating Wet Abrasive Cut-Off Machine is accurate within .002"—with no hard spots, no change in metallurgical characteristics. It results from the WET cut with abundant coolant supplied just where it will do the most good. Speed and economy come from the OSCILLATION of the abrasive wheel . . . the right one for the job.

How to get expert advice on your cutting problems

• CAMPBELL Engineering Service costs you nothing—can save you much. Does your metal cutting problem involve cutting of alloy or high-carbon steel? Our Field Engineers are abrasive-cutting specialists. They can help you arrive at the right combination of a CAMPBELL Cut-Off Machine and ALLISON Cutting Wheel to improve your operation and save you money.

ACCO



**Campbell Machine Division
AMERICAN CHAIN & CABLE**

931 Connecticut Avenue, Bridgeport 2, Connecticut

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industry news in brief . . .

Joseph T. Vinbury appointed chairman, Sales Conference Committee, National Machine Tool Builders' Association, Cleveland, Ohio. **N. Douglas MacLeod, Jr.**, appointed to Tax Sub Committee. **Ludlow King** named assistant to Tell Berna, executive vice president.

William J. Weber named assistant process engineer, Kennametal, Inc., Latrobe, Pennsylvania. **Edward J. Novack** appointed special representative to machine tool builders.

Buffalo Die Supply Corporation appointed distributor in western, central and northeastern New York State and northern Pennsylvania, **Cerro de Pasco Corporation**, New York, New York.

**over
8,000 Different Selections
For Immediate Delivery!**



**Quality-Famous, Heavy Duty
AIR AND HYDRAULIC**

CYLINDERS

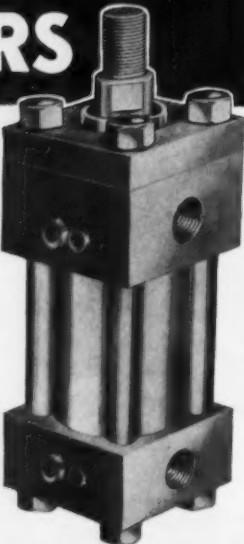
**now "in stock" for
immediate shipment to you
in popular sizes, mountings**

Eliminate costly production delays — speed-up your design and replacement programs — with this greatest quality selection ever offered on such fast delivery service.

AIR CYLINDERS, 200 psi, 1½" through 8" bores, strokes up through 36", over 15 popular mountings, cushioned and non-cushioned.

HYDRAULIC CYLINDERS, 2000 psi, 1½" through 5" bores, strokes up through 36", over 15 popular mountings, cushioned and non-cushioned.

Larger bores (up through 20" air, 12" hydraulic) and longer strokes (up to 22 feet) available on longer delivery.



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MILLER FLUID POWER DIVISION

FLECH-WEEDY CORP.

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CYLINDERS • BOOSTERS • ACCUMULATORS

Sales and Service—From Coast To Coast

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Joseph M. Doroche appointed general sales manager, **Kling Brothers Engineering Works**, Chicago, Illinois.

Van H. Viot elected vice president — employee relations, **Crucible Steel Company of America**, Pittsburgh, Pennsylvania.

Reece Geissinger Associates appointed manufacturer's representative, Specialties Division, **The Torrington Company**, Torrington, Conn.

John E. Barbier appointed manager of engineering, **Jones & Lamson Machine Co.**, Springfield, Vermont. **W. F. Couts** appointed manager, Thread Tool Division.



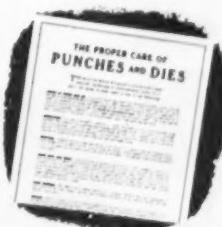
In stock 400 sizes of 21 standard
CLEVELAND PUNCHES!

For your convenience we carry 400 sizes of our 21 standard punches and matching dies in stock. Punching diameters range from $\frac{5}{32}$ " to $1\frac{1}{2}$ ". You will get prompt shipment of any standard punch. Special sizes or shapes will be made to your specifications.

Don't overlook the savings offered by the Cleveland system of standardization. You can punch any size hole from $\frac{1}{8}$ " to $1\frac{1}{16}$ " by using the same coupling nut and punch stem.

Are you obtaining maximum service from your Punches and Dies? Protect tool life—send for copies of our two-color wall instruction chart, "Proper Care of Punches and Dies."

A-5169



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OFFICES AT
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PUNCH & SHEAR WORKS CO.
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Established 1880

POWER PRESSES

FABRICATING TOOLS

CLEVELAND 14, OHIO

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industry news in brief . . .

Don Anderson named district manager of New York Office, **Whitman and Barnes**, Plymouth, Michigan. **Joseph Rodecker** appointed sales engineer, Indianapolis. **Don Parker** named sales engineer, San Francisco. **Harry Peche** and **John Wiers** appointed sales engineers, Chicago district.

Robert A. Horner, retired division manager of the Machine and Small Tool Division, **Barber-Colman Co.**, Rockford, Ill., passed away recently, at the age of 66. Mr. Horner was with Barber-Colman for 37 years, during which time he was closely associated with the advances in the gear cutting industry. In 1930, he became sales manager of the Machine and Small Tool Division, and he was made division manager in 1950. He retired December 31st, 1955. Mr. Horner was a life member of the Metal Cutting Tool Institute.

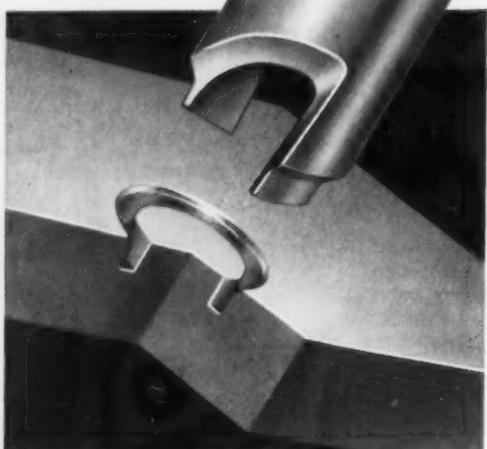
Paul W. Polk named executive vice president, **The Sheffield Corporation**, Dayton, Ohio. **Roy H. Heldenbrand** appointed divisional manager, Threadwell Tap and Die Company, Greenfield, Massachusetts — subsidiary of The Sheffield Corporation.

William F. Fritz appointed plant superintendent, **The Boye and Emmes Machine Tool Company**, Cincinnati, Ohio.

Leo G. Jacques and **Leo F. Brown** appointed vice presidents, **Allied Products Corporation**, Detroit.

TREPANS

- Maximum Diameter — $\frac{5}{8}$ inch.
- For fast-production, multi-spindle machines.
- Specially heat-treated, high speed steel.
- With back taper or radial relief.
- Made by specialists in the design of small tools.



WOODRUFF & STOKES CO.

INCORPORATED

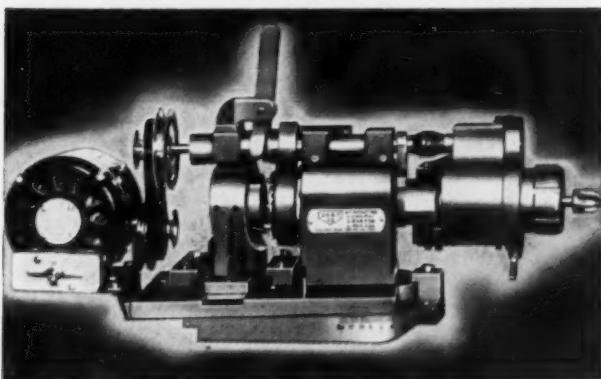
Bldg. 32, 357 Lincoln St., Hingham, Massachusetts



For more data circle 341 on Reader Service Card

Precision CIRCULARITY GRINDING ATTACHMENT

(PATENTED)



Simple, speedy set-ups on this accurate attachment permit fast and easy grinding of form relief, radial relief, form and radial relief together, tapered cylindrical and straight cylindrical. Cutting tool to be produced or reworked is held in collet or between dead centers and revolves on its own axial center. Where full length of spiral cutting tools is to be ground for both form and radial relief, the Circularity Grinding Attachment travel is similar to an O.D. grinder, which insures fine finish, back taper and accurate size.

The Detroit Reamer & Tool Company Model 500 Circularity Grinding Attachment shown above is faster, easier to handle, has positive control, greater adaptability, rugged construction, and is engineered and precision built to provide the finest in precision work. Therefore, it will be of invaluable assistance to anyone whose tooling standards must meet modern production requirements.

You Can Grind
Tools Like These
on a DETROIT REAMER
CIRCULARITY GRINDING
ATTACHMENT

Special Cutting Tools of DEPENDABLE QUALITY



The Detroit Reamer & Tool Co. Plant is equipped with the finest in modern machinery and inspection facilities to provide you with the ultimate in precision tools. Our Engineering and production personnel with 35 years of empirical

knowledge behind them are completely qualified to expertly handle your tool needs. For dependable cutting tools—specify Detroit Reamer & Tool Co.

DETROIT REAMER & TOOL CO.

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industry news in brief . . .

Frank Ross elected to the board of directors, **E. F. Houghton & Co.**, Philadelphia, Pennsylvania.

Calvin K. Kirk appointed product research engineer, **Norton Company**, Worcester, Massachusetts, **Emens Guernsey** named sales engineer and **Oakley C. Walker** named sales and

service engineer, Grinding Machine Sales Engineering Department. **Winton A. Vagedes**, abrasive engineer, Abrasive Division, has taken over special accounts in New Jersey. **Charles A. Bailey** appointed abrasive engineer.

Bernaun C. Leasure, **Louis Lekich**, **John Naffziger** and **Zane H. Markley** appointed sales representatives, **Kennametal, Inc.**, Latrobe, Pennsylvania. **Samuel L. Charles**, **John M. Kidle**, **Michael Pehanich** and **George E. Rupp** named service engineers.

Joseph W. Muller appointed representative in Washington, D.C., area, **Metal Carbides Corporation**, Youngstown, Ohio.

Louis Reiss named controller, **Pratt & Whitney Co., Inc.**, West Hartford, Connecticut.

William T. Hopf named sales and service representative covering the midwest Chicago metropolitan territory, **Chicago - Latrobe Twist Drill Works**, Chicago, Illinois. **Harry T. Strodtman** named representative for the greater portion of Indiana and Kentucky.

Tools-and operators-keep their tempers

. . when Norton



wheels add the "TOUCH of GOLD"

Exclusive precision-processing gives Norton wheels for tool room grinding the advantages of controlled uniformity and built-in balance. They reduce tool spoilage, give you closer tolerances and smoother finishes. Available in the famous G Bond, especially developed for grinding tool steels — and in the popular 32 ALUNDUM® abrasive, that permits faster, heavier cuts. Other aids for better tool room grinding include Norton diamond wheels, the "Crown Jewels" of carbide grinding and general purpose wheels for bench or floor stand grinding.

See your *Norton Distributor* or write direct. **NORTON COMPANY**, Worcester 6, Mass. Distributors in all industrial areas. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

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*Making better products...
to make your products better*

and its BEHR-MANNING division

NORTON COMPANY: Abrasives • Grinding Wheels • Grinding Machines • Refractories
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For more data circle 343 on Reader Service Card

BOSTON *Gear* 100 SERIES SPEED REDUCERS



New COST-SAVING "COMBINATION"

permits easy motor change
... continued operation with spare

The new **100 SERIES RATIO-MOTOR** combines a gear reduction unit and an easily detachable, standard end-mounted motor.

MOTOR CAN BE CHANGED in minutes. Gear unit is undisturbed, preserving alignment. Also, the original motor can be replaced with another type of motor (explosion-proof, etc.) at any time.

ANY MODEL NEEDED — FROM STOCK ... horizontal or vertical — right angle or parallel — single or double reduction.

SOLD WITH OR WITHOUT MOTORS Ratiomotor gear units alone are available as Flanged Reductors . . . you buy and attach any standard end-mounted motors of your choice.

GET CATALOG, full information from your Boston Gear Distributor, or write: Boston Gear Works, 68 Hayward St., Quincy 71, Mass.

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LOCAL STOCKS
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Call your **BOSTON *Gear***
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For more data circle 344 on Reader Service Card

new shop equipment

**Descriptions of new machines, tools
and materials for metalworking.**

Edited by R. L. GRIESINGER

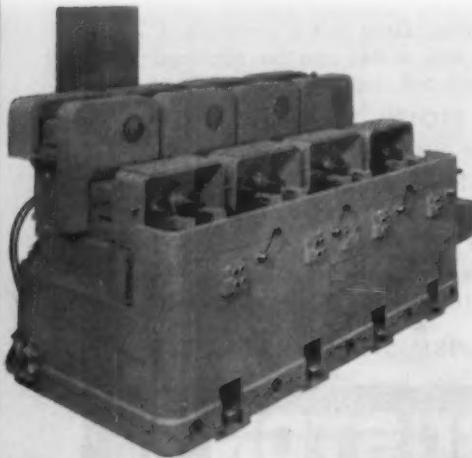
FOUR-STATION BORING MACHINE FOR CONTINUOUS PRODUCTION

The versatility of slide-unit Bore-Matics is said to be exemplified by the four-station, continuous production, Model S machine developed by The Heald Machine Co., Worcester 6, Mass. With one machine operator, this Bore-Matic borizes 240 refrigerator parts per hour, net production. Borizing operations performed on the cast iron work-

piece are turn o.d., face rim and chamfer. This special-purpose machine has a steel weldment base designed for maximum floor space economy. Four hydraulically-powered slide units are mounted on scraped base pads, each slide unit carrying two boring heads and a single motor drive arrangement. Hydraulic pressure is supplied to the slides by a 30-g.p.m. hydraulic power unit mounted at the rear of the machine. Rotating air-operated, centrifugally-damped, work-holding chucks mounted on the boring head are interchangeable for different size parts.

Tool blocks are also designed so that the same tools may be used on different parts. Each of the four work stations is independently operated, two parts being machined simultaneously at each station. Air-operated fixture clamping is accomplished by foot pedal, and the cycle is controlled by push buttons at each station. An automatic chip conveyor mechanism is mounted in the base cavity. Chips are carried down sloping chutes to the conveyor and thence to the right-hand end of the machine for disposal. Other features designed into the machine include proper machine height for loading, ease and speed of operator movement from station to station and tool blocks positioned accessibly for tool change or adjustment.

For more data circle 80 on Reader Service Card



Heald Model S Four-Station Bore-Matic

SURFACE GRINDER HAS BUILT-IN, DIRECT, MOTORIZED SPINDLE

Designated as the No. M3, a precision surface grinder which features a built-in direct 2-h.p. motorized spindle has been announced by Abrasive Machine Tool Co., East Providence 14, R. I. The No. M3 is said to incorporate many of the same design features engineered into the entire Abrasive line, direct spindle drive (completely removable) being the only chief difference between it and the No. 3B. Otherwise, the No. M3 is similar in construction, having the same easily-serviced one-piece construction and rigid, one-piece bed with heavy ribs and reinforced openings.

The machine has a deep, box-like saddle, a well-ribbed table and a 24 x 8 x 12-inch work capacity. It has fully automatic feeds and built-in shock absorbers. The grinder is available with hardened and ground tool steel ways on bed, saddle and table; hardened and thread ground elevating and cross feed screws; and automatic pressure lubri-

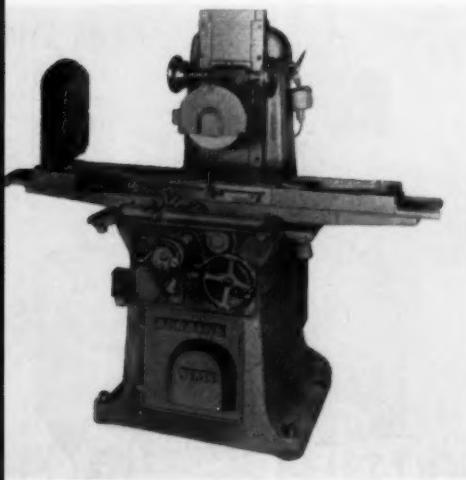
cating system. According to the manufacturer, it is possible to grind with precision accuracy at table travel speeds ranging from 20 to 60 feet per minute with the direct, 2 horsepower motorized spindle.

For more data circle 81 on Reader Service Card

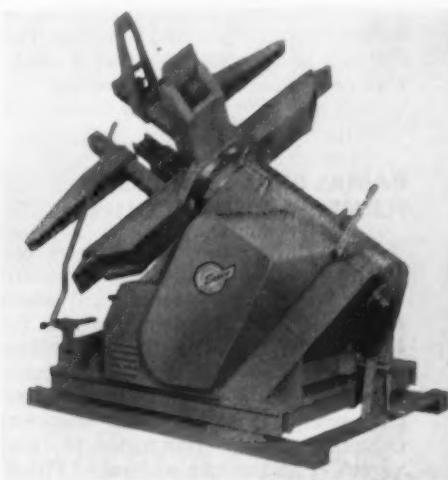
★ ★ ★

STOCK REEL HAS LATERAL ADJUSTMENT FOR ANGULAR FEEDING

Sesco Inc., 8881 Central, Detroit 4, Mich., has announced an angular centering reel which features lateral adjustment for angular feeding of coil stock. The entire reel is mounted on rails, permitting lateral adjustment. This lateral adjustment can be made easily by rotating a crank at the rear of the reel. The crank actuates a lead screw which, through a bronze nut, moves the entire reel into the proper location. The crank can be operated either by hand or motor. According to the manufacturer, the lateral adjust-



Abrasive No. M3 Precision Surface Grinder



View of Sesco Angular Centering Reel

new shop equipment . . .

ment assures a perfect alignment of the coil stock with the die.

The angular reel is of rugged construction to insure long operating life. All controls are grouped to permit one-man operation, and it is power driven at a controlled rate, thus eliminating jerking and over-running. The four expander arms are operated in unison by positive power. They handle the problem of variations in inside diameters of coils, accommodating center i.d.'s from 15 to 28 inches without resorting to adapters. The construction and design of the expander arms is said to permit trouble-free and easy loading. The reel incorporates a variable speed drive so that by a simple adjustment a shorter loop can be maintained on long feed stroke applications. The stock flow is controlled by a simple, rugged electrical loop control which controls the pay off. Uncoiling of stock is started by merely pressing a button. The high-torque variable-speed drive is reversible, with automatic braking to assure rapid starting and stopping. The reel can be operated in either a clockwise or counterclockwise direction.

For more data circle 82 on Reader Service Card

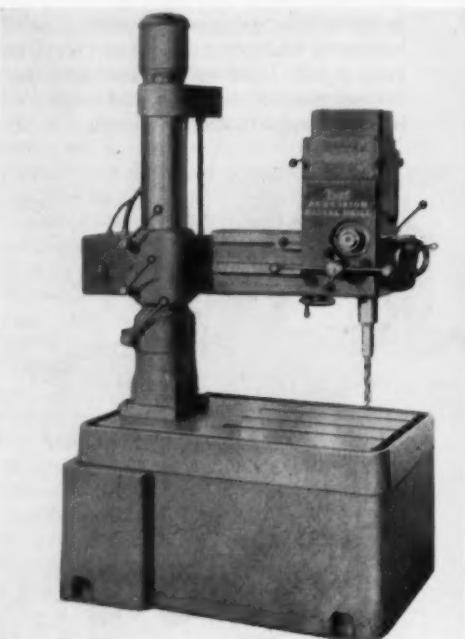
★ ★ *

RADIAL DRILL FEATURES FLAME HARDENED COLUMN

Veet Industries, 25757 Groesbeck Highway, East Detroit, Mich., has announced a precision radial drill which features a flame hardened column for lasting precision. The machine utilizes an extra large 28½ x 48-inch table, provided with ¾-inch T-slots and radial operation. The flame hardened column is double constructed to avoid vibration and insure accuracy. The 3-foot arm is raised and lowered by an individual motor with finger-tip con-

trol. All mechanism is controlled by positive-acting, conveniently grouped handles, dial and wheels mounted on the transmission unit within easy reach of the operator. The transmission is self-contained with all operating parts sealed in oil. All gears are hardened and all shafts are mounted on ball bearings. The machine is said to be capable of handling work weighing up to 5 tons.

The working surface of the bed is heavily reinforced on the under side by six transverse, one auxiliary and two main semi-steel longitudinal ribs, as well as double thick metal all along the under side of the perimeter of the bed. The sub base is fabricated steel construction, strongly welded into a rigid unit. Four bolt holes are provided for secure anchorage to the floor. The machine utilizes 16 geared speeds



Veet Precision Radial Drilling Machine



MORE POWER at the Spindle Nose

The greater work capacity of 10", 11" and 13" Sheldon Precision Lathes comes in part from their extra power. Compared to other lathes of similar swing and price, Sheldon Lathes are built to take larger motors. Sheldon Motor drives are better engineered and better built. In place of a single ordinary V-belt to drive the lathe spindle, these Lathes have twin, Neoprene, cog V-belts (each capable of delivering 40% more power than an ordinary V-belt).

The greater wrap-around of Sheldon's twin cog V-belts not only delivers more power at the spindle nose—permitting heavier cuts, they also eliminate slippage at the spindle—increase accuracy of work. Made of oil, heat and static resistant Neoprene, Sheldon's Spindle belts have a longer life expectancy than other belts of similar type.

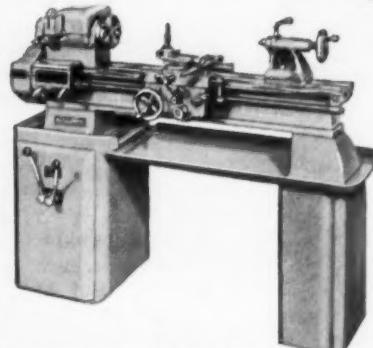


Type E



Type U

UM58P—with 4-speed external lever shift type U, underneath Motor Drive in heavy cast iron Pedestal base with storage space in tailstock leg.



EM56B—with 4-speed Type E, Underneath Motor Drive in Cabinet base.



Write for New G-55 Catalog

SHELDON MACHINE CO., INC.
4520 N. KNOX AVE. CHICAGO 41, ILLINOIS

For more data circle 345 on Reader Service Card

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ranging from 50 to 1,400 r.p.m. Four power feeds provide the right feed for the speed and size of the drill used. The spindle is hardened and ground, No. 3 taper, and operates on heavy duty zero-precision Timken bearings, while the adjustably counterbalanced quill has extra large and long bearing in the head for heavy service.

For more data circle 83 on Reader Service Card

★ ★ ★

BRUSHING MACHINE DEBURRS 200 BROACHED PARTS PER HOUR

An automated deburring machine which is said to be capable of deburring 200 multi-slotted broached parts per hour has been developed by the Ma-

chine Division of Fuller Brush Co., Hartford 2, Conn. An operator places the gear or part on an expanding collet which holds it in place while it moves around an automatic indexing table. The part travels through five brushing stations and is indexed into four different positions, thus presenting all sides of the chucked part to the brushes for the proper length of time. Since every part bears against the brush with the same amount of pressure, uniform and consistent results are obtained.

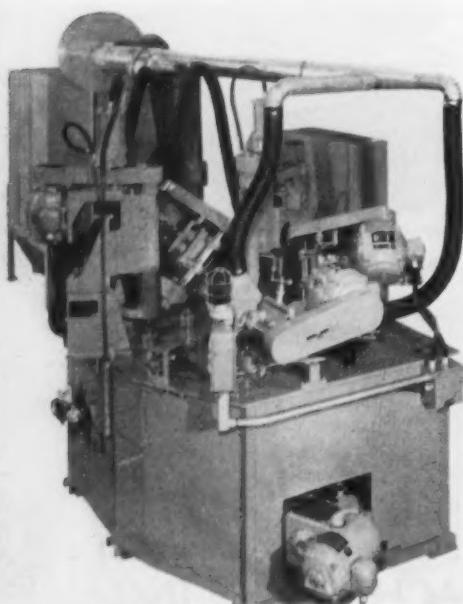
The machine utilizes five Fullanchor brushes, which are wheel brushes made by driving a heavy wire staple through a round steel channel to anchor each tuft individually. These crimped steel wire brushes are 8 inches in diameter and revolves at approximately 3,000 r.p.m. Their penetration of the work is approximately 0.060 inch. The brushes can be adjusted to compensate for wear by turning handwheels on each brush station, individually. Each brush is driven by a 1-h.p. motor. In dry brushing, the metal particles are drawn off by a vacuum system, using hoods about the brushes to carry off the chips. The machine is specifically designed to deburr a special gear or part.

For more data circle 84 on Reader Service Card

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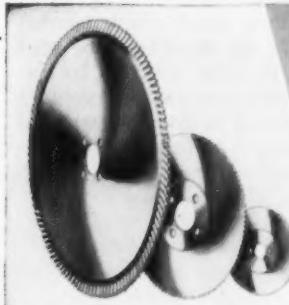
PROCESS PRODUCES THIN-TOOTH SECTIONS IN FLANKS OF SPUR GEAR TEETH

A unique high speed process which is said to produce uniform, accurate, thin-tooth sections in the flanks of spur gear teeth by a patented planetary shaving method has been announced by National Broach and Machine Co., 5600 St. Jean Ave., Detroit 13, Mich. The process is carried out on a newly designed Red Wing Model PSA-4-Inch Planetary Gear Shaving Machine. According to the manufacturer, the process was developed to meet the urgent



Fuller Automated Deburring Machine

Using is Saving with These PROVEN Products *made by* MOTCH & MERRYWEATHER



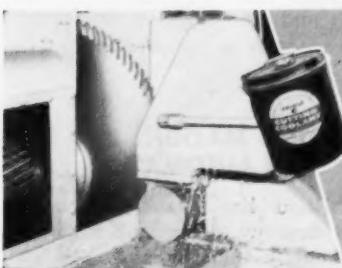
M & M Triple-Chip Saw Blades Save Waste in Metal Sawing

Complete line—segmental and solid—cut-off up to 108" dia., slitting down to 3"—for any machinable material, ferrous or non-ferrous, any size, any shape, any thickness. Less tooth strain, longer blade life, substantial savings in time and costs.



KROSLOK Milling Cutters Save Time in Precision Milling

Kroslok Face Milling Cutters and Shell End Mills cut any machinable material. Simplest design; only three members—body, blade, wedge. Serrations in body mate with cross serrations in blade. A profit-showing aid to accurate production milling.



Three Triple C Products Save Trouble in Tool Care

Triple C Grinding Coolant, Cutting Coolant and Machine Cleaner are Cool, Clear, Clean, Anti-rust, non-greasy, smokeless, odorless, foamless, non-flammable, non-clogging, safe for operators. A notable contribution to tool maintenance.



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Cutting Tool Manufacturing Division —————

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needs of transmission builders for a high-production method that would produce spur-gear thin-tooth sections having uniformity; accuracy of form, depth, width and concentricity; a high quality surface finish; and a sharp step at the edges of the section. When a thin-tooth section of this type is provided in a transmission clutch gear, all tendencies of the transmission to slip out of gear are claimed to be avoided.

A variety of thin-tooth section edge shapes can be produced by the Red Ring process, any of which may be required to suit the requirements for shifting of particular transmissions. The thin-tooth section can be produced in either one or both sides of all the teeth of a spur gear by the process as desired. The profile of the thin-tooth section produced by the planetary shav-

ing process closely approximates an involute form and is usually well within required tenths of a thousandth involute profile tolerances.

To produce a thin-tooth section in a spur gear on the Model PSA-4-Inch machine, the gear is loaded in the toothed chuck jaws which are tightened manually with a hand crank located at the front of the machine. The part is then held in axial location by engaging a quarter-turn nut. The coolant hood is next slung in over the part and cutter assembly. A push button initiates the automatic shaving cycle. The machine occupies a floor space measuring approximately 52 x 42 inches and is 5 feet high overall.

For more data circle 85 on Reader Service Card



CARBIDE FOR STEEL-CUTTING APPLICATIONS

Newcomer Products, Inc., Latrobe, Pa., has announced the availability of Grade NS-3 carbide for steel-cutting applications. The grade has been developed for general purpose machining and milling of steel forgings, castings, weldments, plate and highly abrasive steels. According to the manufacturer, Grade NS-3 has unusual high edge strength and resistance to shock.

For more data circle 86 on Reader Service Card



DIE SINKING MACHINE IS COMPLETELY AUTOMATIC

The "Rigid" line of completely automatic hydrocopy die sinking machines which combine high accuracy and fine finish while providing complete automation of the die sinking and copy milling process is now being marketed by Cosa Corp, 405 Lexington Ave., New York, N. Y. Six different models provide a choice of one, two, four or six-



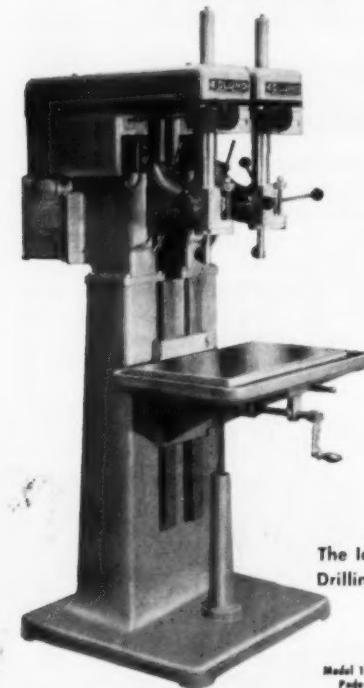
Red Ring PSA-4-Inch Planetary Gear Shaver

EDLUND

Sensitive Drilling Machine

MODEL 1F

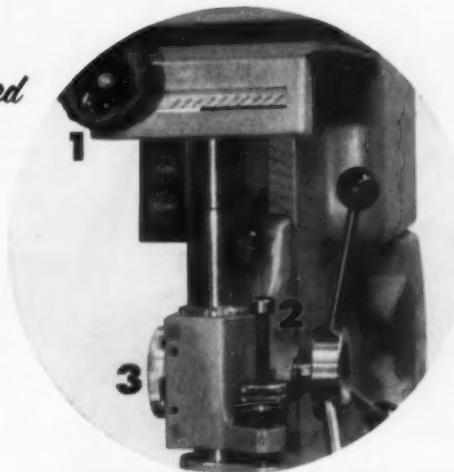
*Infinitely Variable Speed
10,000 R.P.M.*



SPECIFICATIONS

Overhang	7"
Capacity (Cast Iron)	¾"
J/J Morse Taper or Jacobs Chuck	0-½"
Speed Range — Optional	625 to 5000 RPM 1250 to 10000 RPM
Spindles — 1 to 6	
Pedestal and Bench Types	

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1 INFINITELY VARIABLE SPEED CONTROL

Simply turn knob for any speed within range of the machine. Swift, powerful, and positive action.

2 MICROMETER GRADUATED DEPTH GAUGE

Permits accurate pre-set depth control for all precision production drilling. Clearly graduated to .001".

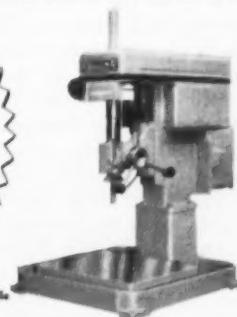
3 ADJUSTABLE SPINDLE TENSION CONTROL

Compensates for different drilling conditions. Three handle feed lever reduces worker fatigue.

The Ideal Drilling Machine for High Speed Sensitive
Drilling of Small Parts, Light Assemblies, and Instrumentation.

Model 1F-2 Spindle
Pedestal Type

America's
Most
Popular
Drilling
Machine



Model 1F-1 Spindle
Bench Type

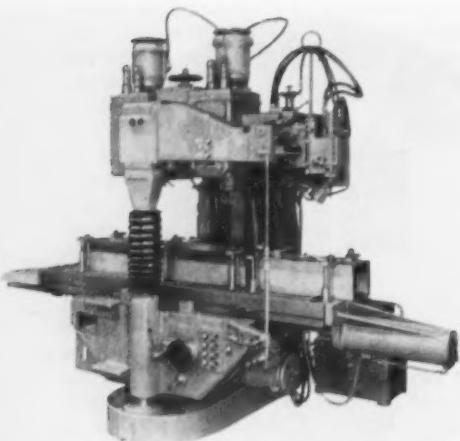
EDLUND
MACHINERY COMPANY Corlton, New York

Division—Precision Castings Co., Inc. Subsidiary—Manufacturing Steel Corporation

EDLUND REPRESENTATIVES IN MAJOR CITIES

For more data circle 348 on Reader Service Card

new shop equipment . . .



"Rigid" Hydrocopy Die Sinking Machine

spindle machines. Operation of all models is basically the same. The machine shown in the accompanying illustration is a two-spindle model in which the tracer head is rigidly connected to the milling head, eliminating any movement error between the two heads. According to the manufacturer, the machines will copy workpieces from masters to a normal working accuracy of plus or minus 0.002 inch. Vertical and longitudinal movements are made by the table and transverse movements by the milling head. All three are hydraulically actuated and fully automatic. Line milling has feed increment at both ends of the stroke. Accurate copying is said to be possible even on dies and molds with deep cavities and steep angles up to 90 degrees.

An outstanding feature of the machine is the automatically constant surface travel of the cutter regardless of contour being milled. In other words, as the cutter begins to dip into the cavity, the horizontal feed is automatically

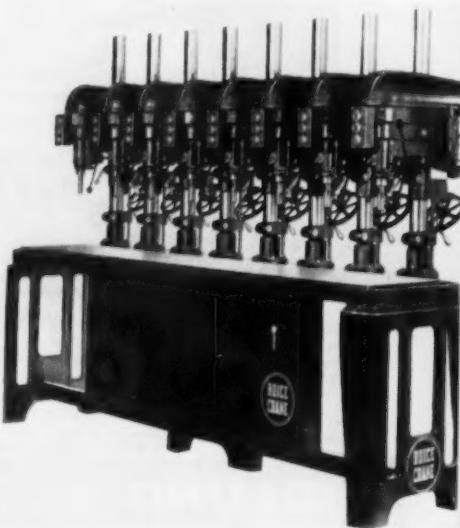
reduced to compensate for the increased vertical feed. When the angle becomes 90 degrees, the horizontal feed stops entirely. Pressure on the tracer is adjustable from 0.5 to 1.5 pounds. This pressure control prevents wear on plastic, plaster or wooden molds and patterns. The machine can be supplied with a 360-degree plus depth profiler head with automatic control for both profile and line milling.

For more data circle 87 on Reader Service Card

★ ★ ★

MULTIPLE HEAD DRILL PRESSES

The addition of numerous multiple head models to its lines of drill presses has been announced by Boice-Crane Co., 937 W. Central Ave., Toledo 6, Ohio. With a new line of work tables, six and eight spindle models are now available as standard, and units with 10, 12 and 16 or more heads can be furnished on special order. All multiple



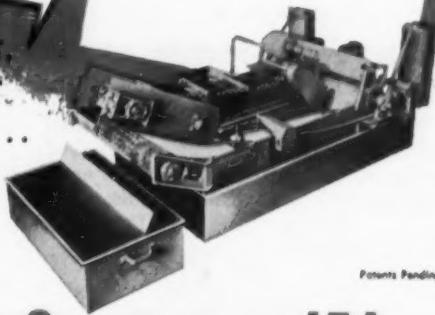
Boice-Crane Multiple Head Drill Press

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CONTINUOUS, FULL FLOW, SELF-CLEANING, FULLY AUTOMATIC FOR THE
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UNEQUALLED IN EFFICIENCY . . . gives filtration performance never before possible on production work. The only separator using gravity flow of liquids *on top* of the greatest magnetic power giving benefit of both gravity and magnetic separation. Reduced filter size . . . **25 to 50% LESS FLOOR SPACE REQUIRED.**

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head models can be supplied in either the Helmet Head $\frac{5}{8}$ -inch or Challenger $\frac{1}{2}$ -inch lines. According to the manufacturer, flexibility is afforded by means of such items as automatic feeds, two-speed motors, spacing of heads or bases, extra duty spindle bearings, remote controls and a wide variety of indexing work holders.

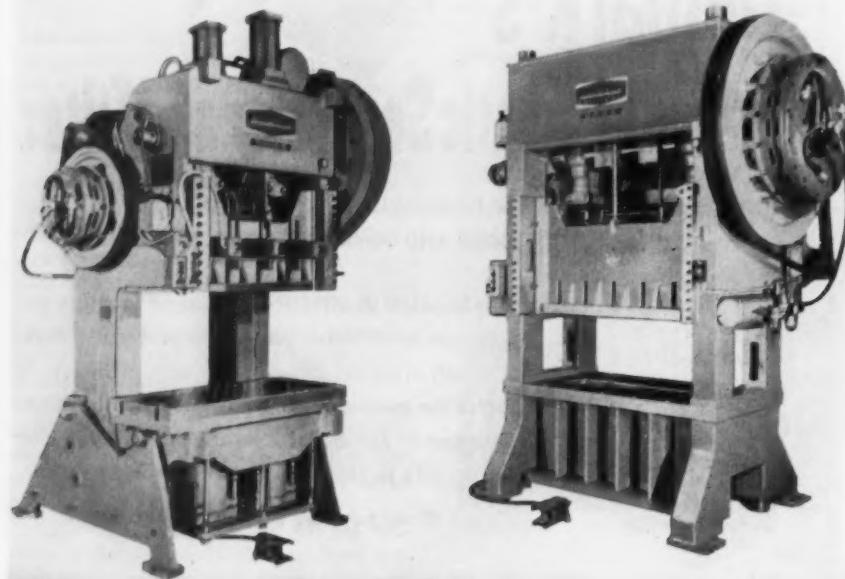
For more data circle 88 on Reader Service Card



DOUBLE CRANK PRESSES FEATURE BOX-TYPE RAMS

Two double crank press lines, both featuring box-type rams, large bed areas, steel construction, low inertia clutches and electrical controls, have

been announced by Johnson Machine and Press Corp., 620 W. Indiana Ave., Elkhart, Ind. One press line includes the double crank, straight side series available in 30, 40, 60, 80, 100 and 150 ton capacities. These are high speed blanking flywheel-type presses with variable speed drives up to 300 strokes per minute, or back-geared presses for drawing, forming, punching or piercing jobs. Shown at the right in the accompanying illustration is the 80-ton model with a 52×30 -inch bed. It has a $48 \times 30 \times 3\frac{1}{2}$ -inch bolster plate, 48×42 -inch ram face and a bed opening of 36×6 inches. The diameter of the main bearings is $43\frac{1}{4}$ inches, and the diameter of the Pitman bearing is $5\frac{3}{4}$ inches. It has a 3-inch slide adjustment and performs at the rate of 60 strokes per minute. The width of the side window opening is 14 inches, and the width between uprights is 15 inches.



Johnson G-2 Series 60-Ton Double Crank Capacity Press with a 56×22 -inch bed (left) and Johnson 80-Ton Double Crank Straight Side Press with a 52×30 -inch bed

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for close sizing. Chuck-
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Libertyville 2-4200

For more data circle 351 on Reader Service Card

208 modern machine shop

new shop equipment . . .

The opening under ends is 12 inches. Other construction features include tie rod construction, Bijur automatic lubrication, air counterbalance, Wichita air clutch, air actuated spring set brake, rotary limit switch and electrical controls which include selector switch for single and continuous stop at top, jog, emergency stop and one or two hand palm buttons and/or foot control.

The second series is known as the G-2 Series and is a line of double crank capacity presses offered in 60, 80, 100 and 125-ton capacities. Shown at the left in the accompanying illustration is the 60-ton model with a 56 x 22-inch bed size. It has a bed opening of 28 x 10 inches and a ram face of 40 x 22 inches. The speed of the backshaft is 303 r.p.m. The geared model makes 50 strokes per minute, whereas the fly-wheel press operates at 100 strokes per minute. The depth of the throat is 12 inches, and opening through back of bed is 36 inches. The standard bolster thickness is 3 inches. This press has a 2½-inch slide adjustment. The shut height at top of bolster is 12 inches, and the maximum stroke is 8 inches with the standard stroke being 3 inches. The diameter of the main bearing is 4 inches. This series also utilizes a Wichita air clutch, air actuated spring set brake, and air counterbalance. It is drilled and tapped for air die cushion. The press is motorized and provides a selector switch for single or continuous operation.

For more data circle 89 on Reader Service Card

★ ★ ★

**BAR FEEDER HANDLES RANDOM
LENGTHS OF STOCK**

Designed for use with the Modern
Cutting-Off Machine, a bar feeder

April, 1956



still the winner
*... and in high speed steels,
nothing beats REX*

The winner and still champion after fifty years is Crucible's REX high speed steel. *And now it's better than ever!* Recent improvements in manufacturing processes have given even higher quality and greater uniformity to every one of its properties.

Why not shop test the new REX yourself? Test it for size, structure, response to heat treatment, fine tool performance. Give it any test you wish. You'll see why it is today, as it has always been — *the standard by which all other high speed steels are compared.*

Ask for REX by name at your local Crucible warehouse. Or order it directly for prompt mill delivery. And for information on REX, and the other Crucible special steels, send for the *Crucible Publication Catalog*. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE

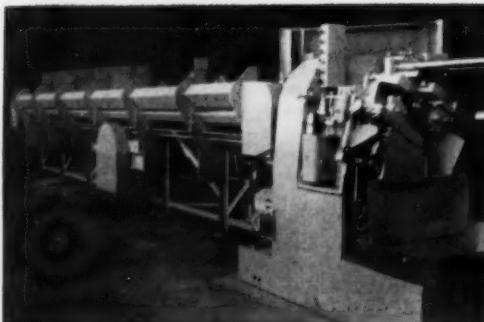
first name in special purpose steels

Crucible Steel Company of America

For more data circle 352 on Reader Service Card

new shop equipment . . .

which handles random lengths of tubing and bar stock automatically, feeding the entire stock load to the machine without any attention from the operator, has been announced by Modern Machine Tool Co., 2005 Losey Ave., Jackson, Mich. Remnants of each bar or tube are automatically ejected, and the end of each new bar is automatically trimmed and chamfered. The feeder has a hopper for use with lighter wall tubing. It holds about 100 pieces of $2\frac{1}{4}$ inch o.d. or equal bulk of other sizes. There is ample room for chain removal when crane loading is desired. An inclined table is used for bar stock or heavy tubing. Where both light wall tubing and heavy bars are used, the feeder may be equipped with both hopper and inclined table. For small diameters and light wall tubing, a V-

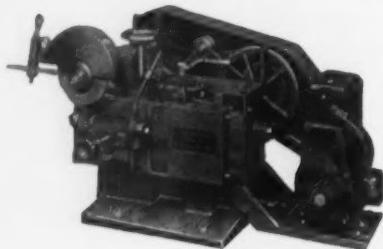


Modern Cutting-Off Machine equipped with automatic bar and tube feeder

trough is used. For large stock there are rollers on which the stock rotates while cutting off, and lifting rollers for the stock while being fed through the spindle.

The bar stock is fed through the spindle by the feed rolls on the machine, and as it nears the rear of the

Costs Less Than 5¢ Each To Sharpen Metal Saws in Gangs



Wardwell sharpens up to 115 saws .015 thick at one time. Makes them better than new. Includes slitting and screw slotting saws, also milling cutters up to $5\frac{1}{2}$ " diameter. Completely automatic. All you do is start it.

Save money — put a Wardwell "35T" to work for you NOW.

Write for Bulletin "35T"



WARDWELL MANUFACTURING CO.
3803 Ridge Road Cleveland 9, Ohio

Maker of largest line of saw and tool sharpening machines

For more data circle 353 on Reader Service Card

BESLY

Precision Tooling and Gaging Application Service

- **SAVES YOU ENGINEERING HOURS**
- **GIVES YOU HIGH PRODUCTION**
- **REDUCES YOUR COSTS**

Determining the style and type of cutting tools and gages that will do a given job best often takes engineering hours that you can ill afford to spare these days.

You can save many of these hours with Besly's Application Service. Besly Service Engineers are completely up-to-date on cutting tool and gage selection and application. They can analyze your jobs, select the right tool, and help lay out tooling set-ups to achieve longer tool life, less downtime, fewer rejects, and increased production. This service includes the development of "special" tools to fit your special needs. If you'd like proof of how it can work for you, write us.

YOU GET ASSURED COST-CUTTING QUALITY WITH BESLY CUTTING TOOLS and GAGES!

COMPLETE LINES

**PRECISION
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AND QUALITY**

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**BESLY**HIGH SPEED
TOOL BITS**BESLY**METRO
CARBIDE
TIPPED
TOOLS**BESLY**METRO
GAGES

Engineering, Service,
and "Specials" are a
BESLY SPECIALTY!

BESLY**BESLY-WELLES**

CORPORATION

Est. as C. H. Besly & Co. 1875

108 Dearborn Avenue, South Beloit, Illinois

For more data circle 354 on Reader Service Card

new shop equipment . . .

spindle the feeder loads a new bar into the fed trough or rollers. This new bar, as it automatically moves forward, acts as a pusher for the stock left in the spindle. When the old bar reaches the collet, the stock stop moves out of the way and the remnant end is ejected. The only adjustment is for different

stock diameters, and this requires only turning a crank until the desired diameter shows on a graduated scale.

For more data circle 90 on Reader Service Card

★ ★ ★

HYDRAULIC MACHINE MILLS IN ANY DIRECTION

Designated as the 3-D Hydro-Cycle, a hydraulic milling machine which is designed for milling left or right, forward or back, and up or down has been announced by Romulus Tool & Engineering, 13581 Huron River Drive, Romulus, Mich. According to the manufacturer, the machine will cut circles to within 0.002 inch tolerance, and closer tolerances are held in the finishing of deep cavities and pockets. Operating with a constant horsepower, the machine features a Romulus All-Hydraulic Spindle with infinite speed selection. The machine is said to reduce bench work filing to a minimum because every die or part produced is semi-finished.

Skilled operators are not required to operate

MEASURING & CHECKING EQUIPMENT

Tailored to your job

HEIGHT BLOCKS
aluminum body, hardened steel top and bottom

ANGLE PLATES

ADJUSTABLE ANGLE PLATES and LAYOUT ANGLE PLATES

ANGLES in 39 sizes

SURFACE PLATES over 50 sizes

BOX PARALLELS in 18 sizes

UNIVERSAL ANGLES in 10 sizes

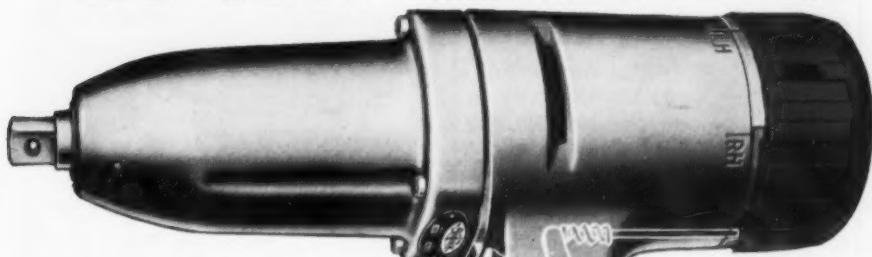
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MACHINE PRODUCTS CORP.

6771 EAST McNICHOLS ROAD
DEPT. F, DETROIT 12, MICHIGAN

For more data circle 355 on Reader Service Card

"One of the best tool investments we ever made!"



The SIOUX Impact Wrench can easily cut nut running time to $\frac{1}{2}$ of what it was by hand. When you think of the number of jobs requiring nut running, and the time involved, it's easy to see why men, who have been buying tools for a long time, say "It's one of the best tool investments we've ever made!"

Expect to cut your labor cost substantially with any impact wrench. Look to SIOUX for leadership in power, performance and endurance.



Model Number 325 \$ 99.75
Model Number 330 127.50

The EXCLUSIVE REVERSE CAP SWITCH LOCK

Prevents reversing with the switch on — eliminates burning commutator, brushes and switch contacts.

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USE SIOUX ALL THE WAY THROUGH
STANDARD THE WORLD OVER...

ALBERTSON & CO., INC.
SIOUX CITY, IOWA, U.S.A.

ELECTRIC IMPACT WRENCHES • GRINDERS • FLEXIBLE SHAFTS • POLISHERS • DRILLS
HAND SAWS • SANDERS • VALVE FACE GRINDING MACHINES • ABRASIVE DISCS

For more data circle 356 on Reader Service Card

new shop equipment . . .

the milling machine. Vertical, cross and longitudinal movements are synchronized and controlled through a pencil-type stylus arm. All movements are manually controlled by merely guiding the stylus arm over the surface of the die or part which is to be duplicated. The 3-D Hydro-Cycle Miller

Spin your RIVETS
*faster and more
economically
on the NOISELESS*



**LINLEY
RIVETER**

Rivet spinning on the Linley is a sure way to cut production costs. With Linley equipment, you can easily produce finely finished rivets even in close places. Send us samples of the work you want riveted, and without obligation we'll show you how it can be done the Linley-way and what it will cost.

Machines available for handling iron and cold rolled steel rivets up to $\frac{3}{8}$ " and larger size rivets in softer materials.

Send for Bulletin R today.

LINLEY BROTHERS CO.
Also builders of JIG BORERS
671 State St. Ext., Bridgeport 1, Conn.

For more data circle 357 on Reader Service Card

COOPER WEYMOUTH
OPEN THROAT
AIR OPERATED SLIDE FEED
For Power Press Operation

Operates on standard shop air lines. Easy to set up and adjust, holds to extreme accuracy. Made in five sizes. Feeds lengths to 36", up to 18" wide on mechanical and hydraulic presses.

COOPER WEYMOUTH, INC., 277 Noble Ave., Bridgeport 8, Conn.

For more data circle 358 on Reader Service Card



Romulus 3-D Hydro-Cycle Milling Machine

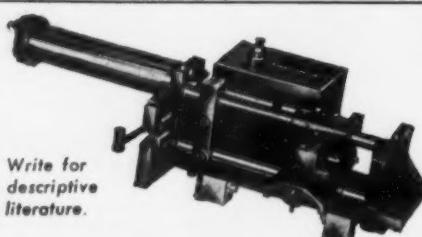
is claimed to be ideal for milling aircraft structural members, whether they are made of aluminum or the tougher metals.

For more data circle 91 on Reader Service Card

★ ★ ★

CONSTANT SURFACE CUTTING SPEED MECHANISM FOR MONA-MATIC LATHE

A constant surface cutting mechanism for the recently announced Model



Write for
descriptive
literature.

We
Cracked
the

**TIME
BARRIER!**

with

**DPS MODERN
POWER METHODS!**

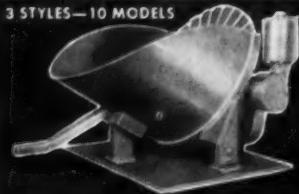
No need for PRODUCTION DRAG on
these assembling and feeding jobs!

When you can combine greatly stepped-up output
with reduced costs, quality control and uniform
results, it adds up to benefits you can't afford to
ignore . . . Advantages that are emphasized by the
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**DPS POWER SCREWDRIVERS and
SELECTIVE PARTS FEEDERS**

And remember, D.P.S. specially trained engineers
are ready to tackle your problem and come up with
the right answer.

3 STYLES—10 MODELS



Shown are two products from our expanded up-to-the-minute line. Get the story.

5 MODELS
BENCH AND
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Write for catalog
and full details.

DETROIT POWER SCREWDRIVER CO.

2807 W. FORT ST.

DETROIT 16, MICH.

For more data circle 359 on Reader Service Card

April, 1956

modern machine shop 215

new shop equipment . . .

21 Mona-Matic Manufacturing Lathe is now being offered by The Monarch Machine Tool Co., Sidney, Ohio. Functioning in conjunction with the Multi-cycle Programmer controlled, four cut, fully automatic work cycle of the Model 21, the constant surface cutting speed mechanism provides automatic varia-

tion of drive motor speed to maintain the desired surface cutting speed on each of the various diameters and contours of each workpiece in the run. According to the manufacturer, the mechanism provides greatly increased tool life, higher rates of production and improved workpiece finishes.

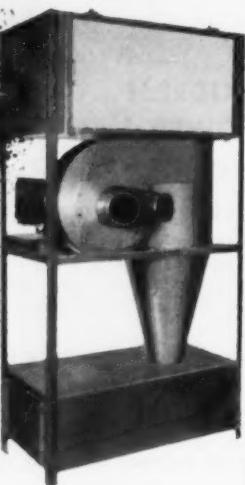
During operation when the Multi-cycle Programmer of the lathe indexes from one cutting cycle to the next, causing the cutting tool to be automatically positioned for the required cut, an electrical signal indicating the exact distance from the cutting tool tip to the workpiece centerline is transmitted to the constant surface cutting speed mechanism. This mechanism then automatically adjusts the machine's drive motor speed and as a result, the spindle r.p.m. to produce the desired surface cutting speed on the workpiece.

If during the actual cut the drive motor deviates from the proper speed, a feed-back signal enables the constant surface control to compensate for the error.

When contours are turned under control of the "Air Gage Tracer" unit of the Model 21, the constant sur-

EFFICIENT-LOW COST

Dust Collection



Easy installation . . . efficient low-cost operation . . . simplified maintenance, make Dustkop FIRST among equipment to collect most all industrial dusts. There are Dustkop models to eliminate your dust problems . . . that are space saving, self-contained units, or exhaust type for rafter, ceiling or outside location. Write for descriptive literature.

**37 STANDARD MODELS
TO CHOOSE FROM**
• READY TO USE

DUSTKOP
STOPS DUST



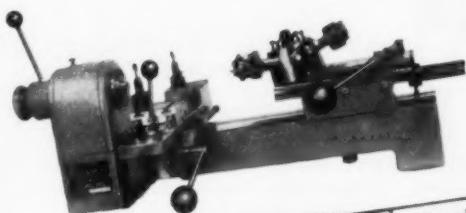
Also a Complete Line of Mist Collectors

AGET MANUFACTURING COMPANY
1398 E. CHURCH ST. • ADRIAN, MICHIGAN

For more data circle 360 on Reader Service Card

Derbyshire

*fine
precision
equipment*

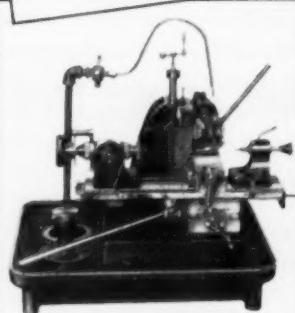


MODEL No. 750

BED 22"

CENTER HEIGHT - 7.50 CM

COLLET CAPACITY - .315"

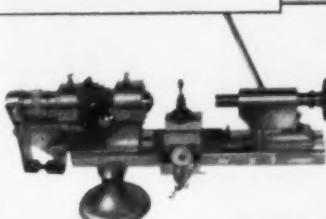


MICROMILL

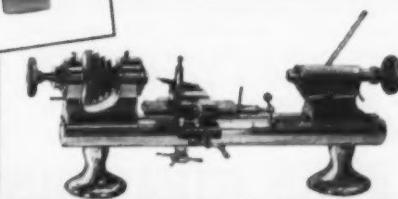
ELECT LATHE - 18" BED

CENTER HEIGHT - 2.35" (6 CM)

CHUCK CAPACITY - .004" to .315"



MAGNUS LATHE - 12" BED
CENTER HEIGHT - 8 CM
COLLET CAPACITY - .315"



ELECT LATHE - 18" BED

CENTER HEIGHT - 2.35" (6 CM)

CHUCK CAPACITY - .004" to .315"



WEBSTER WHITCOMB

BED 12"

CENTER HEIGHT - 3 CM

COLLET CAPACITY - .1969"

F. W. DERBYSHIRE, INC.

157 HIGH ST.

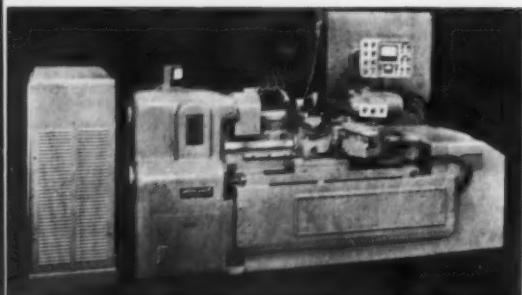
WALTHAM

MASS.

Write for full details

For more data circle 361 on Reader Service Card

new shop equipment . . .



Monarch Model 21 Mono-Matic Lathe with constant surface cutting speed mechanism

face cutting speed mechanism continually varies the drive motor speed to automatically maintain the required surface speed at the point the tool tip is actually cutting. If desired, however, the mechanism can be controlled man-

ually at any time. The electrical control equipment of the constant surface cutting speed mechanism is housed in a separate cabinet enclosure positioned near the drive motor end of the machine. The main drive motor of the Model 21 lathe is a 25-h.p. variable speed a.c. unit. Available surface speeds are said to range from 200 to 1,175 f.p.m. and can be maintained over a 4 to 1 diameter range.

For more data circle 92 on Reader Service Card

★ ★ ★

ADJUSTABLE FLOATING REAMERS IN WIDE RANGE OF SIZES

The Wickman Mfg. Co., 10325 Capital Ave., Oak Park, Detroit 37, Mich., has introduced the Wickman-Brown Adjustable Floating Reamer in a range of sizes from $\frac{1}{2}$ to 4 inches in only 19 basic units. The reamers were originally supplied in a set of 14 units,

BURR KEYSEAT MILLING MACHINE, PLANER TYPE

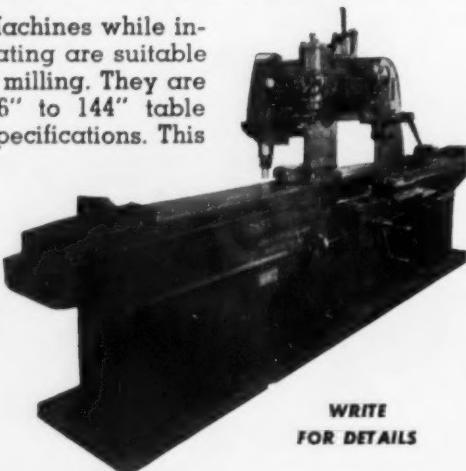
The Burr Keyseat Milling Machines while intended primarily for keyseating are suitable for a large variety of plain milling. They are made in six sizes from 36" to 144" table length. Also built to your specifications. This is a sturdy, heavy-duty machine equipped with a vertical head and Timken anti-friction bearings throughout.

Also Burr Portable Shaft Keyseaters in five sizes for hand, drill and motor operation.

**JOHN T. BURR
& SON, INC.**

Established 1890

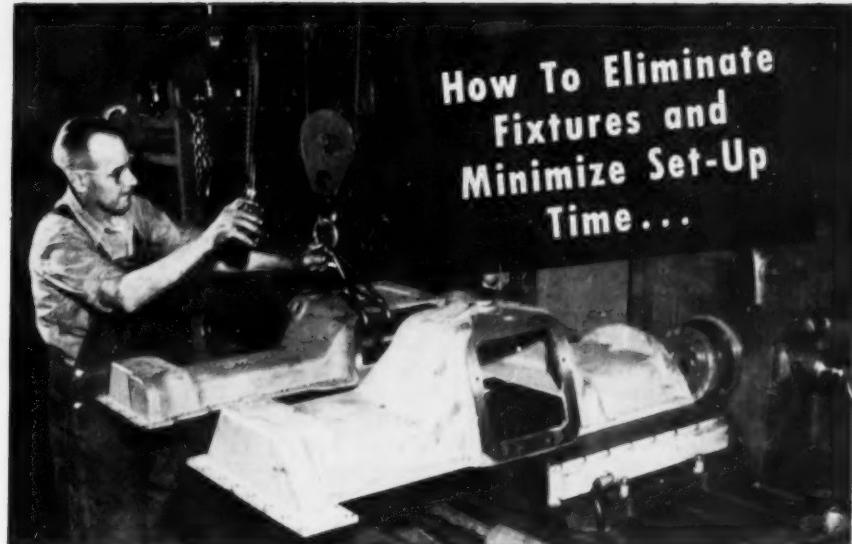
431 KENT AVENUE



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FOR DETAILS**

BROOKLYN 11, NEW YORK

For more data circle 362 on Reader Service Card



How To Eliminate
Fixtures and
Minimize Set-Up
Time...

With Sundstrand Magnetic Chucks

Here's how Caterpillar Tractor Co. uses Sundstrand magnetic chucks to eliminate fixtures and cut down set-up time. A pair of chucks are used as a permanent set-up for milling the bell end flange on 26 different oil pans. Prior to installation of the Sundstrand chucks, their pans required 7 different fix-

tures and from $\frac{1}{2}$ to $1\frac{1}{2}$ hours set-up time. With magnetic chucks, a throw of a switch will secure or release either or both pans instantly. If you have milling or grinding operations in your plant it will pay you to investigate Sundstrand magnetic chucks.

**Free
Data**

Write for this new magnetic chuck bulletin — contains useful information on the complete line of Sundstrand Power-Grip Chucks. Ask for bulletin 566-M.



SUNDSTRAND
Magnetic Products Co.

Division of Sundstrand Machine Tool Co.
1020-9th St. • ROCKFORD, ILLINOIS

For more data circle 363 on Reader Service Card

new shop equipment . . .

giving a range from $\frac{3}{4}$ to 4 inches. To this set has now been added the smaller range of from $\frac{1}{2}$ to $\frac{3}{4}$ inch in five additional units. According to the manufacturer, the two blades of the unique tools are adjustable by a direct reading micrometer and have

**NEW NESTING TYPE
TOTE PANS**

Sturdy 16 ga. metal.
20" long x 12" wide
 $\times 6\frac{1}{4}$ " deep. Drag
holes and handles at
both ends.

J. L. LUCAS & SON, INC.
Bridgeport 5, Conn.

For more data circle 364 on Reader Service Card

SAVE SET-UP TIME

**with
REPCO
LIVE
CENTER
SET**

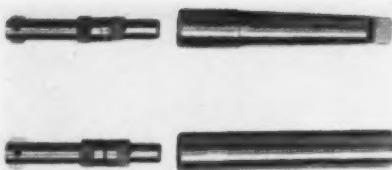
Set consists of heavy duty live center plus 6 interchangeable adapters from a point to $6\frac{1}{4}$ " dia. bell. Saves costly set-up and machining time often needed to make special, large diameter centers.

SIZES: 3 to 5 M. T. B&S, Jarro, and Straight Shanks available. Female and special centers on request.

WRITE FOR BULLETIN NO. 101
DEALER INQUIRIES INVITED

ROCKFORD ENGINEERED PRODUCTS CO.
2324 23rd Avenue • Rockford, Illinois

For more data circle 365 on Reader Service Card



Wickman-Brown Adjustable Floating Reamers

positive and constant float. Adjustment can be made with the reamer in position, and the blades may be reground in the usual manner without affecting micrometer reading. The blades can be supplied in high speed steel or tungsten carbide tipped.

For more data circle 93 on Reader Service Card



PLASTISOL CAN BE APPLIED BY SPRAYING FOR INDUSTRIAL COATINGS

Michigan Chrome and Chemical Co., 8615 Grinnell Ave., Detroit 13, Mich., has announced Miccosol Spray S-2003, a plastisol which can be applied by spraying for industrial coatings. Said to be a true 100 per cent plastisol, it is sprayed as received with conventional spray equipment—no thinners or solvents are required. This means that industrial applicators, specializing in linings and coatings of items as large as tank cars, are able to utilize the cor-

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—Except Screw Machine Cams—

Design Assistance Offered

KIDDE PRECISION TOOL CORP.

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For more data circle 366 on Reader Service Card

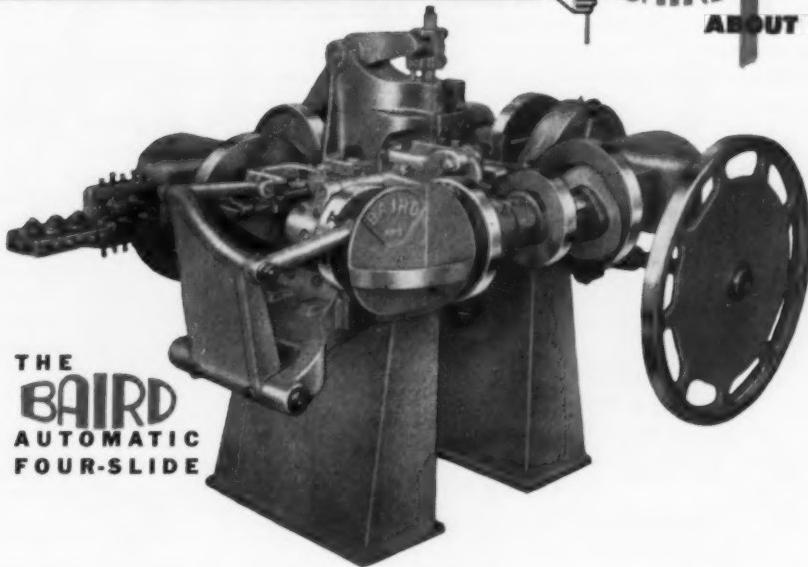
... IF IT'S A HIGH PRODUCTION PROBLEM ...

ASK



BAIRD

ABOUT IT



THE
BAIRD
AUTOMATIC
FOUR-SLIDE

NO MACHINE IN THE WORLD CAN MAKE A GREATER VARIETY OF PARTS... OR PRODUCE THEM ANY FASTER

Yet, new wire shapes, formed by hand, are continually submitted to us for tooling setups to produce them automatically on Baird Four-Slide Machines. We usually solve the problems.

Coiled wire is taken from a reel, is straightened, fed and cut off to the required length . . . then formed and ejected as a remarkably accurate part. The per-minute speed of production is almost unbelievable . . . and the unit cost likewise.

You may purchase your machine tooled for specific repetitive production, then add other tooling and attach-

ments as required to increase the versatility of production of both wire and metal ribbon articles to the greatest degree.

Various sizes of standard machines give you a selection of wire lengths to 32½" . . . dia. to ½" . . . or flat ribbon metal products to 1½" wide.

Baird engineers will develop your tooling from your parts or from blueprints. The Baird Four-Slide Bulletin (Wire or Ribbon Metal) will open new avenues to low-cost competitive production. Your copy on request—write Dept MM.

THE BAIRD MACHINE COMPANY

STRATFORD

CONNECTICUT

WHERE YOU WILL GET THE HELP OF SPECIALISTS
ON THESE ESSENTIAL PRODUCTION PROBLEMS

For more data circle 367 on Reader Service Card

April, 1956

modern machine shop 221

BB&B

new shop equipment . . .

rosion-resistant properties of a plastic isol in a practical, efficient manner.

Applied with a spray, Miccosol Spray S-2003 provides a non-porous film. Films of 60 mils thickness can be applied in one application without sagging of material. If multiple coats are required, a short cure time is all that

is needed between applications. A contrasting color can serve for layer identification, if desired.

For more data circle 94 on Reader Service Card

★ ★ ★

ELECTRODE IS DESIGNED FOR EASE OF OPERATION

The Lincoln Electric Co., Cleveland 17, Ohio, has announced an all-position

E-6013 electrode, designated as the "Fleetweld" 37, for alternate or direct current, designed especially for ease of operation. Its features are said to be particularly useful either in welding sheet metal where burn-through, sticking and poor fit-up may be problems; or when using low open circuit voltage welding machines, such as are generally used on farms or in small shops; or for steel plate fabricating where an all-position, easy operating electrode is desired.

According to the manufacturer, the electrode has excellent arc stability. The arc is steady on both alternate and direct currents, even when used with welding machines having an open

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- For Precision Assembling •
- Available in All Metals •
- Complete Range of Sizes •
- Rust Resistant Coating •
- Standard Turned Pins •
- Centerless Ground Pins •
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New Threaded End Pin
Has Many Uses for
Blind Hole Assemblies



John Gillen Company

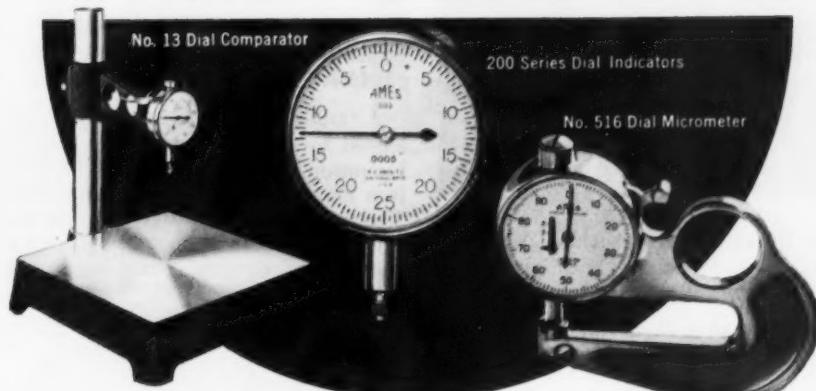
Every Type of Keying and Pinning Device

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CICERO 50,
ILLINOIS

For more data circle 368 on Reader Service Card

Taper Pins
•
Groove Pins
•
Machine Keys
•
Woodruff Keys

AMES



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for time-saving accuracy and dependability

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29 Ames Street, Waltham 54, Mass.

MANUFACTURER OF MICROMETER DIAL GAUGES • MICROMETER DIAL INDICATORS
For more data circle 369 on Reader Service Card

April, 1956

modern machine shop 223

You Get Things Done With Boardmaster Visual Control



- ★ Gives Graphic Picture of Your Operations — Spotlighted by Color
- ★ Facts at a glance—Saves Time, Saves Money, Prevents Errors
- ★ Simple to operate — Type or Write on Cards, Snap in Grooves
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For more data circle 370 on Reader Service Card

224 modern machine shop

new shop equipment . . .

circuit voltage as low as 44 volts. In addition to being stable, the arc is soft and smooth and easy to handle. A drag technique may be used. Slag characteristics make for quick removal, good bead appearance and simplify vertical up welding. The electrode is available in 1/8, 5/32 and 3/16-inch sizes.

For more data circle 95 on Reader Service Card

★ ★ ★

1-TON HYDRAULIC PRESS IS VERSATILE AND SIMPLE IN OPERATION

A 1-ton Multipress, especially designed for versatility and simplicity of operation, has been developed by Denison Engineering Co., Columbus, Ohio. The press has been designed for cutting production costs on such operations as assembling, riveting, punching, mark-



Illustration of Denison 1-Ton Multipress

April, 1956



FAST SERVICE

YES SIR!

We specialize
in **FAST** service
when you need it.

Your orders are
handled **FAST**
at **ACCURATE**.

IMMEDIATE SHIPMENT

from huge inventory
at our factory . . .

or from large stocks
located in your area.

Special Sizes are given
extra attention to be sure you get **FAST** service.

The next time you need drill bushings . . .
try **ACCURATE**! You'll be pleased!

Write for New Price List — designed for quick, accurate reference



ACCURATE
BUSHING COMPANY



442 North Avenue
GARWOOD, NEW JERSEY

SUNset 9-1121

ASA STANDARD DRILL BUSHINGS • PIERCING PUNCHES • PRECISION SPECIAL PARTS

For more data circle 371 on Reader Service Card

new shop equipment . . .

ing, trimming, pelleting, compacting, testing, straightening, broaching, swaging and similar operations. Among the outstanding features of the press are duplication of ram pressure every stroke, precision ram alignment, fast cycle time, simple to set up, ample daylight to adapt tooling and interlocked

manual controls to eliminate accidental tripping of the ram. The new Multi-press operates on 110-volt, 60-cycle single-phase circuit and can be wired for operation on 220-volt single-phase. The entire press is completely self-contained for easy installation, simple operation and maintenance.

The hydraulic system of the press is a single power unit which can be removed and replaced in a few minutes. No special hydraulic skills are needed to maintain and operate the press.

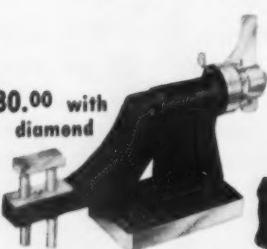
The press, with ram pressure of 500 to 2,000 pounds, is electrically controlled, weighs 225 pounds and stands only 22 inches high. It is designed to be operated individually or in a production line, with a dial table, power screw feed hopper, stock feed and other automatic devices. Two operating switches, one on each side of the press, are used to start the operation. Holding both buttons will cause the ram to stay down under full pressure and tonnage as controlled by the relief valve. Releasing the buttons immediately after the ram starts will cause it to go down until it meets a re-

now

TWO NEW VERSATILE TOOLS

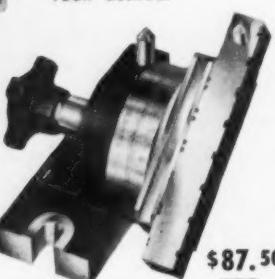
FOR ECONOMICAL DRESSING — The G-5 radius dresser is a precision engineered tool that will dress either a convex or a concave radius from .015" to 1.750" on a 7 inch or 10 inch wheel. Graduated stops allow you to dress any desired portion of a radius. The spring tension journal gives chatter free operation that may be set to the exact radii desired.

\$80.00 with diamond



A LOW COST DOUBLE DUTY TOOL — The G-2 angle dresser and tool holder is actually 2 tools in one, having an easy to read vernier scale 0° to 180° giving accuracy within 2" of 1"; an excellent time saver to set up small jobs to be milled, drilled, tapped, etc. on any desired angle.

\$87.50 with diamond



PLUS FREE HANDY STORAGE BOX.

\$149.50 COMBINATION PRICE FOR BOTH TOOLS WITH DIAMONDS.

Send your order direct but include the name of your distributor.

DISTRIBUTORS WANTED. Write for complete information.

ROTHFUSS TOOL CO.

Box 202 Elmwood Station • Providence 7, R. I.

For more data circle 372 on Reader Service Card

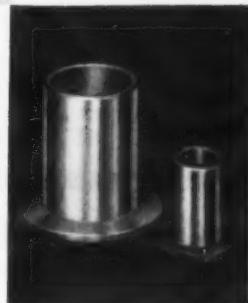
THIS *new* BEARING SERVICE HELPS YOU IN MANY WAYS

The development of a complete standardized line of stock Sintered Bronze Bearings and Bars by Bunting opens the door to many economies and advantages in production and maintenance of machinery and mechanical components.

Here is a far more complete range of standard sizes than has heretofore been available in this material. Bunting's powdered bronze stock line is the first to include all ASTM standard sizes to ASTM recommended dimensions and tolerances in both plain and flanged bearings and thrust bearings.

Together with the long established Bunting stock line of Cast Bronze Bearings and Bars, these new sintered bronze Bunting products bring to mechanical industry ready-to-use bearings that will squarely meet your blue print and cost requirements.

Both Bunting Cast Bronze and Bunting oil filled, self-lubricating sintered powdered Bronze Bearings and Bars are available to you through your nearest Bunting Distributor. He has in stock all sizes for your immediate needs. Ask him or write for complete lists and dimensional data on Bunting Cast Bronze and Bunting Sintered Bronze Bearings.



Bunting

BUSHINGS, BEARINGS, BARS AND SPECIAL PARTS
OF CAST BRONZE AND POWDERED METAL

The Bunting Brass and Bronze Company, Toledo 1, Ohio
Branches in Principal Cities • Distributors Everywhere

For more data circle 373 on Reader Service Card



new shop equipment . . .

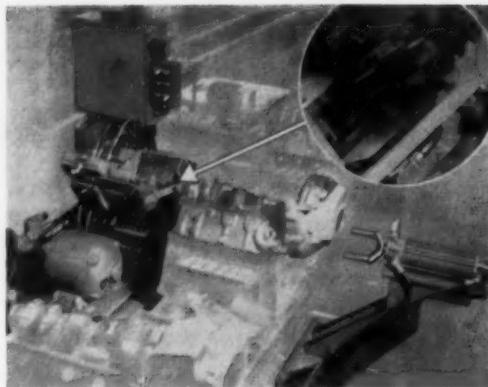
sistance, then automatically reverse, return to the "up" position and remain motionless. The relief valve may be set to the desired pressure.

For more data circle 96 on Reader Service Card

★ ★ ★

HYDRAULIC MARKING UNIT FOR AUTOMATED PRODUCTION

Cadillac Stamp Co., 17315 Ryan Rd., Detroit 12, Mich., has introduced a hydraulic marking unit especially developed for operation on automated production lines. The installation presented in the accompanying illustration shows such an automated unit installed in one of the most advanced automobile engine assembly lines in the industry. This unit begins its cycle after receiving a signal from the master con-



Cadillac Hydraulic Marking Unit installed in an automobile engine assembly line

trol panel and also from the workpiece in the proper station. The work cycle consists of clamping, marking, automatic indexing of numbering head, unclamping and recording the engine

GREENLEE HAND BENDER



for quickly making smooth small-radius bends in pipe, tubing, conduit

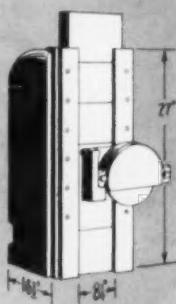
Forming small-radius bends without flattening or kinks is simple, speedy work with a GREENLEE Hand Bender. Ideal in the shop for pipe and tubing installations on machines... especially designed to form neat bends for sharp corners, nooks and other close quarters. Various models and sizes for steel, copper, brass and aluminum tubing or pipe, rigid and thin-wall conduit



GET FREE FOLDER E-207 AND BOOKLET E-201. Complete facts and prices on the Greenlee Bender line. Write Greenlee Tool Company, 1900 - Herbert Avenue, Rockford, Illinois.

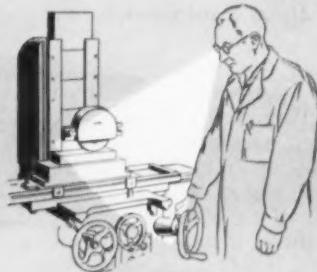


For more data circle 374 on Reader Service Card



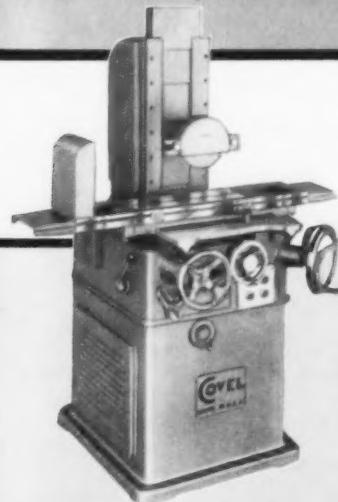
RIGID VERTICAL SLIDE

Grinding wheel and head are supported by the rigid vertical slide which is 16½" in depth. Length of vertical ways is 27". Distance between vertical ways is 8¼".



CONVENIENT CONTROLS

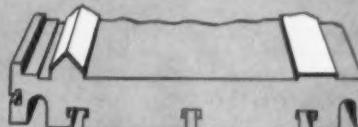
Elevating hand wheel with floating vernier dial pointer is handily located below table level where it doesn't interfere with operator's access to the work. Power cross feed engaged by control on front of cross feed hand wheel.



Engineered to give you the most accurate gage, form tool and surface grinding performance for a low initial cost.

COVEL No. 10 HAND OR POWER FEED SURFACE GRINDER

6" x 18" x 15"



HARD CHROME TABLE WAYS

Hard chrome plating preserves the original built-in accuracy. Chrome is applied direct to alloy cast iron surface of V and flat table ways after they are precision hand-scraped.

You'll want to know all about the rugged, low-cost No. 10, so write or 'phone today for all the details.

COVEL PRECISION GRINDERS

HYDRAULIC & HAND FEED SURFACE GRINDERS
UNIVERSAL CUTTER & TOOL GRINDERS • DRILL GRINDERS

DEPT. M-46
BENTON HARBOR,
MICHIGAN
WAInut 6-6157

For more data circle 375 on Reader Service Card

new shop equipment . . .

serial number on a continuous paper tape. This cycle consumes 8 seconds.

After completion of the work cycle, a signal is transmitted to the master control panel, and the workpiece can be moved out of its station. The marking unit is then ready to resume another cycle. It performs all these func-

tions without the services of an operator. The marking machine is designed with a universal mounting plate.

For more data circle 97 on Reader Service Card

★ ★ ★

CABINET-MOUNTED SLIDE FEED IS EQUIPPED WITH STRAIGHTENER

Designated as the Model SFC-24-24, a cabinet-mounted motor-driven slide feed which is

equipped with an eight roll plain straightener with a pair of motor-driven take-in rolls has been announced by U. S. Tool Co., Inc., Ampere (East Orange), N. J. This is an independently driven slide feed for feeding coil stock into punch presses or press brakes. Since it is individually driven, the feed can be used for feeding in any direction—right to left, left to right, front to back, or back to front. The unit has a width capacity up to 24 inches, and maximum feed length is adjustable up to 24 inches at one stroke. The feed unit also utilizes a 5-h.p. motor with variable speed control.

**Engineered
with the
quality
features
that make
end milling
jobs
PAY OFF!**

Engineered with the hardest practical grade of carbide to "breeze" through the toughest metal cutting applications.

Nelco end mills are precision ground all over—from shank to cutting edge.

174 different end mills—diameters from $\frac{1}{4}$ " to 5"—2, 3, 4, or 6 flutes—straight or taper shank—a tool for every application! The complete Nelco end mill line means a tool for every job—from stock—without the delay and cost of a "special".

Your equipment relies on its tooling for production—and in any machine—new or old—Nelco carbide tipped tools really PRODUCE!

Send today for the new Nelco catalog—over 850 tools, 850 ways to better production at less cost.

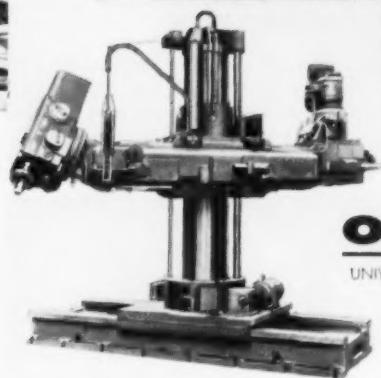
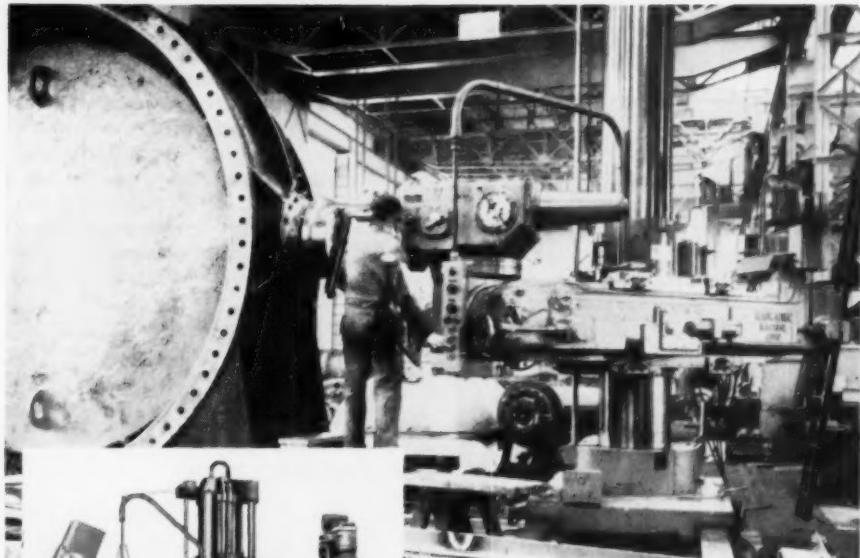


for that extra EDGE
in production.

NELCO TOOLS

NELCO TOOL CO., Inc. • Manchester, Connecticut

For more data circle 376 on Reader Service Card



**A JOB THAT
ONLY A *Kaukauna***
UNIVERSAL RADIAL DRILLING, TAPPING AND BORING MACHINE
CAN DO -

faster, easier, at lower production cost.

In the large steam turbine division of one of the world's great manufacturing corporations, one setup of the Kaukauna Model 140-U Universal Radial Drilling Machine is generally all that is required for all the holes in heavy, cumbersome housings.

Drilling usually starts with the vertical holes on the top of the housing. The headstock is then swung to an angular position to drill and tap the required 3½-inch and 4-inch pipe taps. Continuing the swing to horizontal position, holes are drilled and reamed for

mounting flanges, pipe flanges and accessories.

During all these operations, neither the Kaukauna nor the housing is moved.

Time and labor savings are tremendous. Before the Kaukauna Radial was employed, these huge castings were carried to the radial drills and horizontal spindle machines where they were set up at precarious angles on blocks and jacks for certain holes; then moved to other machines for other drilling operations.

—and there is also an important plus saving! Many times during assembly, it may be necessary to do reworking—redrilling stud holes or adding additional holes to an assembled part. When these situations arise, the Kaukauna can be carried by overhead crane right to the assembly area and the necessary operations performed without disassembling or dismantling the unit.

Learn now what a Kaukauna will do for you by time estimates on your various jobs.

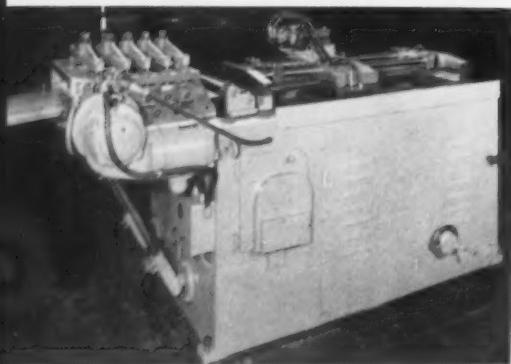
Consult your nearest Kaukauna distributor, or phone, wire or write direct.



Kaukauna MACHINE AND FOUNDRY DIVISION
GIDDINGS & LEWIS MACHINE TOOL CO. • KAUKAUNA, WISCONSIN, U. S. A.

For more data circle 377 on Reader Service Card

new shop equipment . . .



U.S. SFC-24-24 Cabinet-Mounted Slide Feed

include electric clutch and brake; electrically-controlled air-operated gripper mounted in feed block; electrically-controlled air-operated check arranged

so pilots can be used; inching control on feed for inching material into dies; manually-operated push-button for single tripping the press; automatic arrangement for single stroke operation with press running continuously; selector switch for single stroke or continuous operation; and counter for cycle feeding that can be preset to allow the feed to make a predetermined number of strokes (up to 400) before the press is tripped.

For more data circle 98 on Reader Service Card

★ ★ ★

**SURFACE GRINDER HAS
AUTOMATIC DEPTH FEED
OF 0.00004 INCH**

Adjustment accuracy to 0.00004 inch is a feature of the "Blohm" Hydraulic Surface Grinders now being marketed by Aaron Machinery Co., Inc., Dept. M, 45 Crosby St., New York 12, N. Y.

Greenerd
HYDRAULIC PRESSES

for • ASSEMBLING
• BROACHING
• FORMING
• MOLDING
• STRAIGHTENING

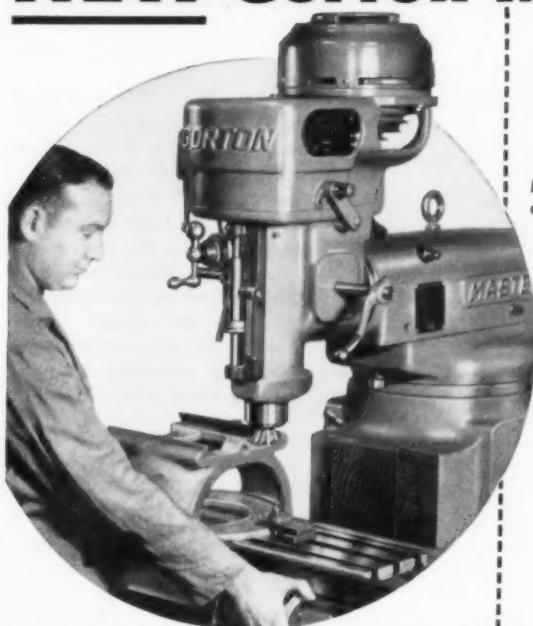
Hydraulic presses made to conform to J.I.C. standards. Pictured at right is 15-ton hydraulic press.
Write for Catalog 554.

GREENERD ARBOR PRESSES

NASHUA • EST. 1883 • NEW HAMPSHIRE

For more data circle 378 on Reader Service Card

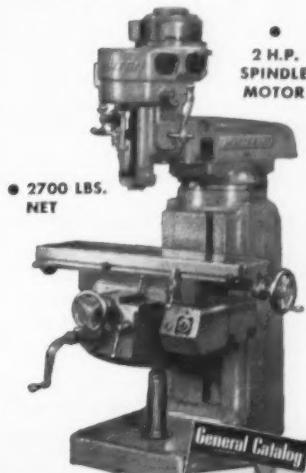
NEW Gorton Mastermil



\$2750
(WITH ELECTRICS)

Never before a machine like this at
a dollar a pound!

- PRECISION SPINDLE; 10 SPEEDS,
80-5600 R.P.M. STANDARD
- DESIGNED AND BUILT TO PRO-
VIDE SUSTAINED ACCURACY
- LONGITUDINAL FEED, 22 INCHES
- SADDLE LENGTH, 24 INCHES
- CROSS FEED, 10½ INCHES
- VERTICAL FEED OF KNEE, 15¼
INCHES
- SPINDLE FEED, 4 INCHES



For . . . Milling, boring, duplicating in tool rooms, model shops, pattern shops, production lines, general machine shops, experimental laboratories, machine shops, schools — wherever high-speed vertical milling is done.

Also available . . . Infinitely variable spindle feed from $\frac{1}{4}$ inch to 8 inches per minute. Infinitely variable table feed (longitudinal) in 4 ranges: from $\frac{1}{2}$ inch to 60 inches per minute.

Ask for special bulletin, No. 2699, on new Gorton Mastermil and for general catalog, 1704-1655, covering the entire Gorton line.



GEORGE **GORTON** MACHINE CO.

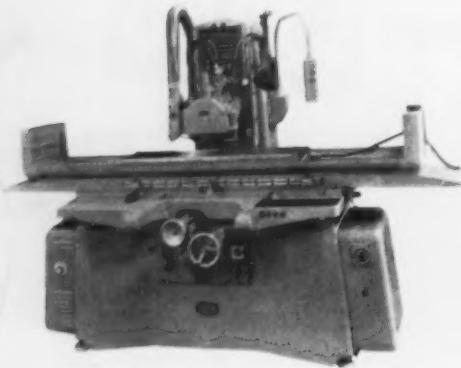
1704 RACINE STREET • RACINE, WIS., U. S. A.

Tracer-Controlled Pantographs, Duplicators—standard and special . . . Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

For more data circle 379 on Reader Service Card

A 8732-1PA

new shop equipment . . .



Blohm Model HFS-12 Hydraulic Surface Grinder

"Microtip" infeed and depth feed control on the large-capacity grinders is said to provide for automatic push-button depth feed of 0.00004 inch and cross feed of 0.0002 inch, after a rough hand adjustment. The Model HFS-12 has a grinding capacity of 14 inches wide x 48 inches long. Four other models range in capacity down to 14 x 18 inches, with the Model HFS-10 having an 18 inches wide x 40 inches long capacity. Each model utilizes a powerful 5-h.p. two-speed motor which is mounted directly on the spindle, "oilmatic" type adjustable tapered bear-

ings in the spindle, and rugged table and saddle mounted on ball bearing assemblies operating on hardened and precision ground chrome-nickel-steel ways.

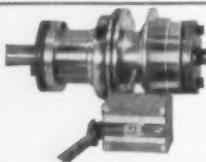
According to the manufacturer, these table and spindle features combined with unusually sturdy construction minimize vibration and help insure maximum precision. Wheels up to 4 inches wide can be used in conjunction with a cross feed up to 2½ inches per stroke for maximum production and efficiency. The various models can also be furnished with an optical "Finimatic" device to afford a completely automatic grinding capacity, with the machine stopping itself after three idle runs.

For more data circle 99 on Reader Service Card

★ ★ ★

**POSITIVE DUPLICATOR
QUICKLY AND EASILY LOCATES
HOLES FOR FABRICATION**

Wales-Strippit Corp., 345 Payne Ave. North Tonawanda, N. Y., has announced the Wales Positive Duplicator, an ingenious pantograph-like mechanical device for quickly and easily locating holes in simple or complicated patterns and actuating the punching mechanism from a template by remote control. Designed for use with the Wales Fabricator, the duplicator consists of a one-piece steel work table with



Transmission Type

**RLH
CONSTANT TORQUE COUPLINGS
with AUTOMATIC COMPENSATION
for Friction Variation**

WRITE FOR BULLETINS



Spindle Type

Torque settings unaffected by normal variations in co-efficient of friction. Breakaway torque and running torque become truly constant.

SPECIAL SHANKS FURNISHED TO ACCOMMODATE INDIVIDUAL APPLICATIONS

BUFFALO MACHINERY CO., Inc.

837 GRANT STREET BUFFALO 13, N. Y.

For more data circle 380 on Reader Service Card



Its Magic Performance Can Win You Many "Production Oscars"

This "jack-of-all-jobs" will do the work of a half dozen machines, yet it does not take up any more floor space and represents very little more investment, than a shear or punch, or any other single-purpose machine.

Here is another production-boosting and cost-cutting feature: with this versatile machine two men, working on each side of the machine, can turn out the same or totally different jobs, at the same time! Enables you to double output, using your present staff.

Available in 3 sizes for light, medium or heavy work. Kling Combination Shear, Punch & Copers are speeding production and cutting costs "in the best of companies." Write us for names of some of these firms in your industry—and also for a copy of the New Kling Combination Bulletin No. 347-A.

Since 1892 For data on other Kling Metal Working Machines ask for Bulletin 100

Active Kling Distributors cover practically every marketing area of U.S. and Canada. Write us for name of one nearest you.

BROS. ENGINEERING WORKS

1320 N. KOSTNER AVE. • CHICAGO 51, ILLINOIS

Exclusive Canadian Distributor: Brown-Boggs Foundry & Machine Co. Ltd., Hamilton, Ont.

Export Distributor: Simmons Machine Tool Corp., 58 E. 42nd Street, New York 17, N.Y.

For more data circle 381 on Reader Service Card



1244MM

new shop equipment . . .

accurately machined surface and T-slots running across both dimensions for clamping templates in position. It is mounted on a heavy steel plate base skirt, with two steel shelves. It is securely bolted to the left front side of

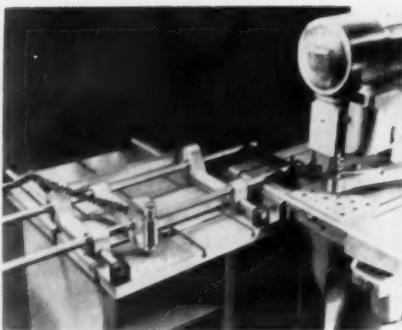


Illustration showing Wales Positive Duplicator installed on a Wales Fabricator

Miccero Supreme
LAY-OUT AND IDENTIFICATION DYE

7 COLORS

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

MICHIGAN CHROME & CHEMICAL COMPANY

8615 Grinnell Ave. • Detroit 13, Mich.

For more data circle 382 on Reader Service Card

the fabricator work table. On each side of the duplicator table is mounted a hardened and ground bar on which a carriage assembly rides for forward and backward positioning. This carriage contains bearing supports for two hardened and ground traverse rods for lateral positioning. The locator assembly with hand grip and push button is mounted securely on these cross rods.

On the extreme inner end of these traverse rods, outside the carriage assembly itself and over the fabricator work table, are mounted adjustable quick-action clamps for securing the workpiece in position. Rolling on special ball bearings, the locator carriage assembly is smoothly and effortlessly moved in any direction, and the workpiece, securely held by the clamps, is

MODEL 500 CONTACT WHEEL BELT GRINDER

The Fastest Known Method
of Increasing Production



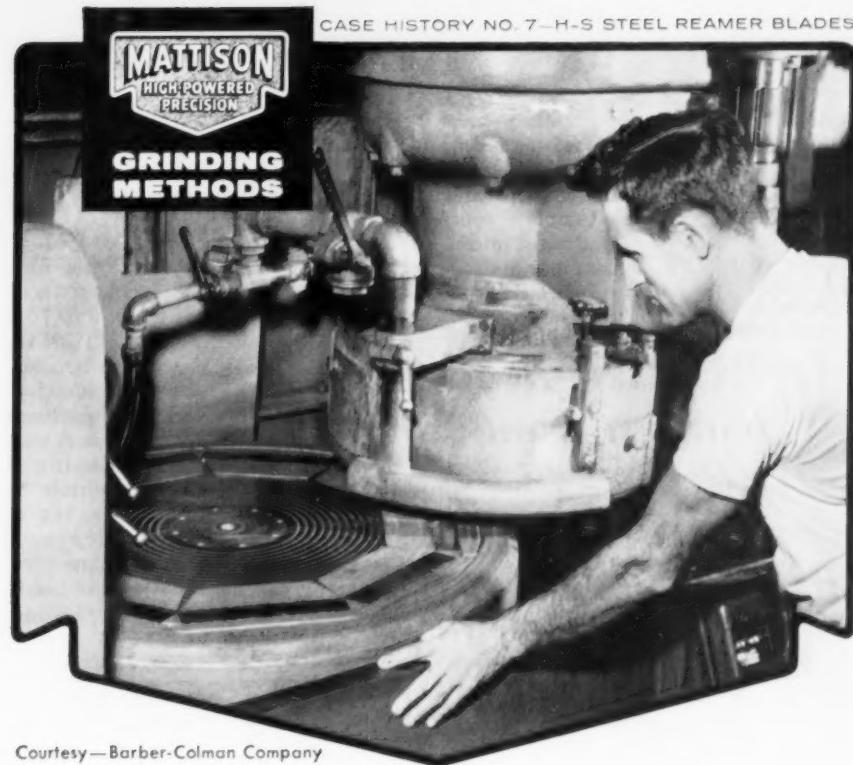
Rotates 360° and locks in any operating position desired.

WRITE FOR COMPLETE INFORMATION
ON INCREASING YOUR PRODUCTION

B & E MFG. CO., INC.

ZIDE EAST 21 STREET
KANSAS CITY 9, MISSOURI

For more data circle 383 on Reader Service Card



Courtesy—Barber-Colman Company

Grinds 262 reamer blades per load

. . . holds size and flatness within .0003"



Unretouched photo, with blade purposely lighted to exaggerate cross-grind finish, which averages 10-12 micro inches, rms.

This Mattison No. 36 grinds 262 reamer blades per load on both sides, holding size and flatness within .0003 in. Blades are M-3 (Type 1) high-speed steel. User reports exceptional finish with a 60 grit wheel.

This accuracy is possible because Mattison's extra-heavy and extra-wide column is one solid piece, bolted to the base. "V" and flat column ways are longer, wider, and thicker. This prevents the head slide from binding and permits the machine to feed accurately in .0001" increments. Write for Bulletins 144 and 146. **Mattison Machine Works, Rockford, Ill., U.S.A.**



HIGH-POWERED
PRECISION
SURFACE
GRINDERS

For more data circle 384 on Reader Service Card

new shop equipment . . .

automatically moved simultaneously into position under the punching mechanism of the fabricator. As each hole is located, the operator simply depresses the locator pin into the template aperture. This automatically closes a microswitch in the locator assembly and actuates an air cylinder in the rear of

the fabricator, which in turn operates the trip mechanism, effecting the punch.

For more data circle 100 on Reader Service Card

★ ★ ★

SURFACE TEST INDICATOR HAS DOUBLE FACE

Superior Indicator Co., P. O. Box 734, Rochester 3, N. Y., has announced

the Model 75X Surface Test Indicator which features a double face and which reads both sides. A constant reading is always visible to the operator as the indicator is turned, thus eliminating the use of mirrors. The double-faced dial is enclosed by two non-breakable crystals that can be easily read at



With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon-high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

**You Harden It—We'll Drill It—
With "HARDSTEEL"**

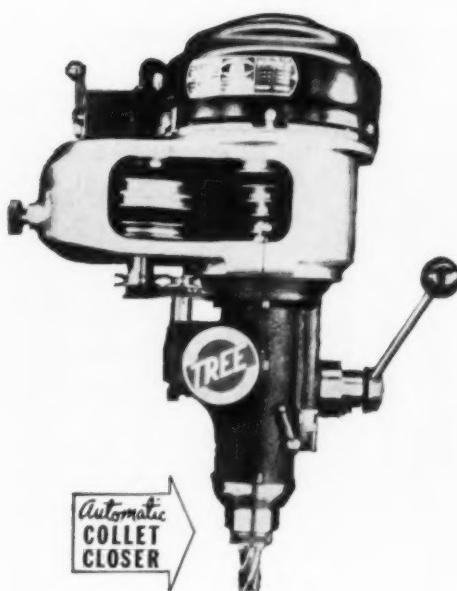
BLACK DRILL COMPANY, INC.
1372 East 222nd St. • Cleveland 17, Ohio

**Also makers of—
BLACK DRILLING
UNITS—AUTOMATIC,
SELF-CONTAINED—
FOR COST-CUTTING
PRODUCTION ON
ALL MATERIALS**
Write for information

For more data circle 385 on Reader Service Card

**View of Superior
Model No. 75X Sur-
face Test Indicator**

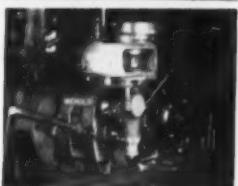
do you need . . . VERTICAL MILLING CAPACITY?



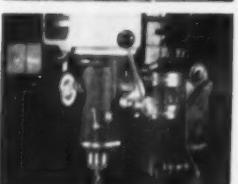
Cincinnati



Nichols



Kempsmith



Milwaukee



Bridgeport



You can add vertical milling capacity by adapting the versatile TREE MH-4 Vertical Milling Attachment to your present horizontal milling machine. The MH-4 gives you all angle milling, drilling and boring with a high degree of accuracy because of its built-in rigidity. Spindle — alloy steel, hardened and ground. Roller drive eliminates back-lash. Quill — 4 inch travel. Enclosed micrometer depth stop. Power feed. Write today for full information.

EXPORT ADDRESS: States Trading Co., 401 Brdwy., New York 13, Cable Address: "STRADESO"

TREE TOOL AND DIE WORKS
1600 JUNCTION AVENUE RACINE, WISCONSIN

For more data circle 386 on Reader Service Card

new shop equipment . . .

arm's length. No holding rods hide either face as the indicator swivels from the end of the case. The universal swivel which holds the indicator permits adjusting of the indicator to any position within a range of from 0.150 to 6 inches. According to the manufacturer, the model 75X is especially adaptable for jig boring and jig grinding setups, but can also be used on all toolroom or production work. Simple holding adapters

are available, making the indicator usable on a surface gage, magnetic base or vernier height gage.

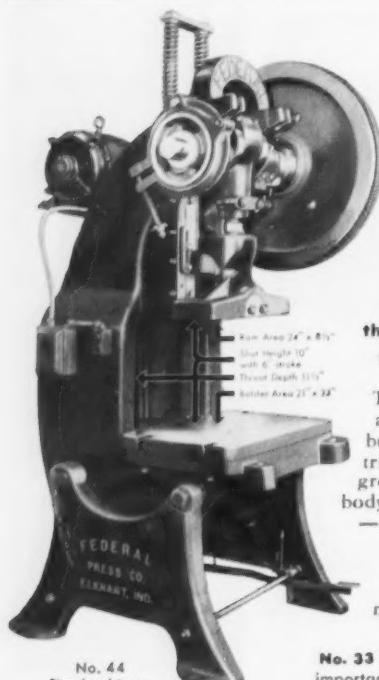
For more data circle 101 on Reader Service Card

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STANDARD MICRO DRILL JIG BUSHINGS

Acme Industrial Co., Dept. BH, 200 N. Laflin St., Chicago 7, Ill., has announced that micro drill jig bushings are now available in standard sizes from No. 80 (0.0135 inch) to No. 55 (0.0520 inch). The new micro drill jig bushings are offered in two standards—Acme and A. S. A. Special sizes are available on special order.

By standardizing on the production of its micro drill jig bushings, Acme is able to produce them in quantity, to precise catalog tolerances. The new standard bushings are available in all



No. 44
Flywheel type
35-ton capacity

FEDERAL PRESS COMPANY, 604 Division Street, Elkhart, Indiana

FEDERAL *Open Box* PRESSES

31 Years of Quality Construction

For more data circle 387 on Reader Service Card

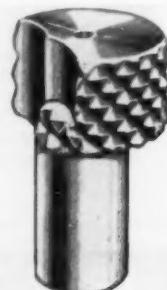
For economical
handling of....

BIG JOBS

You can't beat
the FEDERAL #33 and #44
with "oversize" dimensions

These FEDERAL PRESSES are expressly designed for bulky jobs—such as die-cast trimming, laminations, progressive die work. Both embody the extra quality features—plus quality materials and workmanship for which FEDERALS are famous. In geared and flywheel models; air clutch optional. Write for Catalog.

No. 33 Press—26-ton—with following important dimensions: Ram Area: 18" x 7 1/2", Shut Height: 9 1/2" with 2 1/2" stroke. Throat Depth: 8 3/4", Bolster Area: 16" x 32".



Acme Standard Micro
Drill Jig Bushing

Progressive
SCREW MACHINE DEPARTMENTS
STANDARDIZE
with



Collets - Feed Fingers - Pads
for
All Automatics, Turret Lathes,
Tool Room Lathes and Millers

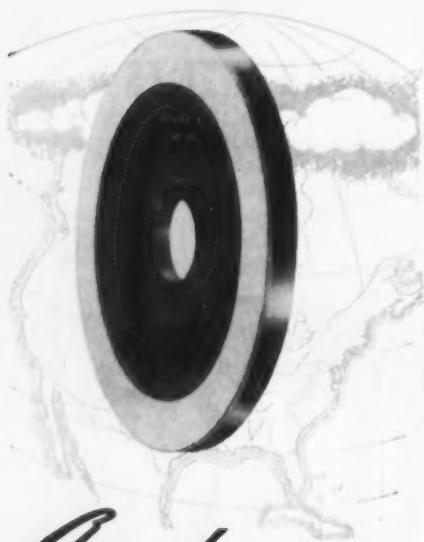


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MURRAY HILL
NEW JERSEY

new shop equipment . . .

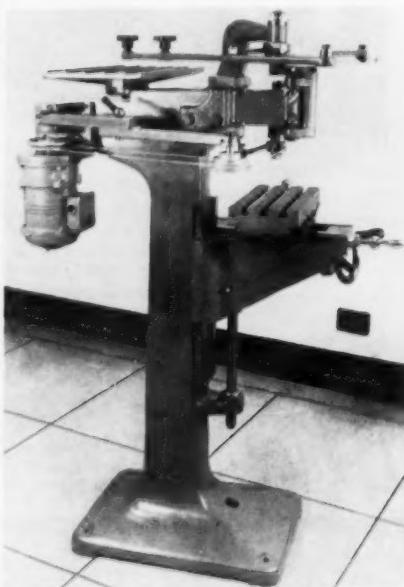
types: plain press fit, shoulder press fit, removable slip fit and replaceable stationary.

For more data circle 102 on Reader Service Card

★ ★ ★

IMPROVED MACHINE PRODUCES FINE, PRECISE ENGRAVING

J. Arthur Deakin & Son, 150-28 Hillside Ave., Jamaica 32, N. Y., has announced the improved Alexander No. 1A Standard Two-Dimensional Engraving Machine. According to the manufacturer, several entirely new features have been incorporated to make the engraving machine ideal for producing and duplicating unusually fine, precise engravings. The self-contained sliding head includes the pantograph,



Improved Alexander 1A Standard Engraver

For more data circle 389 on Reader Service Card

Magnetic Magic

solves handling problem
for **Permaglas Division, A. O. Smith Corp.**

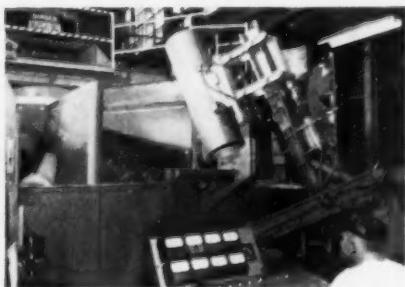
PROBLEM: To automatically unload water heater shells from cleaning machine without damaging shell surface prepared for glass coating. Only upper half of shell periphery is accessible.

SOLUTION: Hanchett Magna-Lock chucks on unloading machine designed and built by Permaglas Division's engineers.

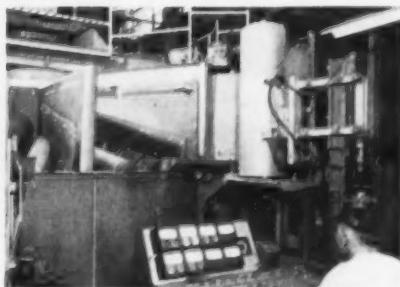
RESULT: Fast, automatic handling. No damage to shell surface.



1. Unloading mechanism positions Magna-Lock chuck above shell. Chuck is energized, pulling shell against chuck's V-face.



2. Held firmly by chuck, shell is lifted from cleaning machine and raised to vertical position.



3. Chuck is de-energized, releasing shell. Air-actuated plungers push shell away from chuck. Shell is transferred automatically to next operation.

If you have a transfer problem Hanchett Magna-Lock chucks may offer a solution. Write Dept. MM-46



Hanchett MAGNA-LOCK CORPORATION

Magnetic Chucks and Devices

BIG RAPIDS, MICHIGAN, U.S.A.

For more data circle 390 on Reader Service Card

new shop equipment . . .

drive, spindle assembly and swan neck. The simple direct drive from motor to spindle gives greater accessibility to the head and the workpiece. Eight spindle speeds up to 15,000 r.p.m. are provided by a 1/3-h.p., 110-volt, 60-cycle, single-phase, flange-type motor.

Without altering the basic design of the machine, the working area, it is claimed, has been increased 150 percent. To duplicate engravings, the operator simply moves the sliding head over the piece on the work table. A slight adjustment to the table may be necessary. Otherwise, no change in set-up is required. The standard work table size is 11 $\frac{1}{8}$ inches long x 6 $\frac{5}{8}$ inches wide. A larger table measuring 17-5/16 inches long x 11 $\frac{3}{4}$ inches wide

can be supplied. If desired, the sliding head of the machine is available as a separate unit.

For more data circle 103 on Reader Service Card

★ ★ ★

STAGGER TOOTH WOODRUFF KEYSEAT CUTTER

Quality Tool Works, 792 S. Market St., Waukegan, Ill., has announced a stagger tooth Woodruff keyseat cutter which is available as a standard catalog item. The shear cutting action of the cutter is said to cut freely, producing minimum heat and friction which results in long cutter life. According to the manufacturer, the stagger tooth Woodruff keyseat cutter is particularly helpful in cutting tough, hard-to-cut materials, such as high alloy steels, heat treated shafts, stainless

★ ★ ★ ★

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ACE DRILL BUSHING CO., INC.
5407 Fountain Ave., Los Angeles 29, Calif.

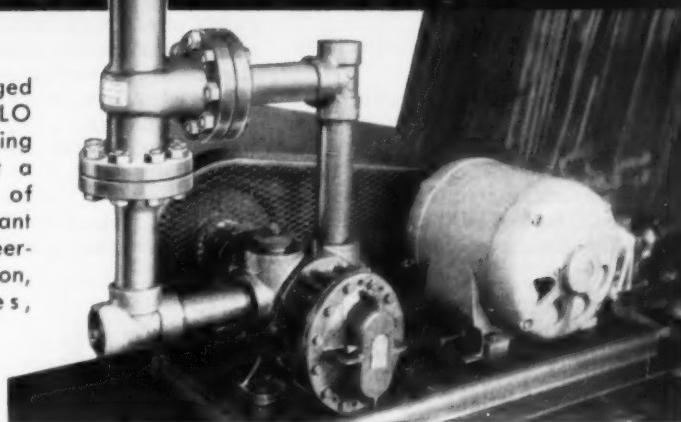
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OIL-RELIEF HYDRAULIC VALVES

This 2" flanged relief FULFLO VALVE is being operated at a temperature of 40° in the plant of Gay Engineering Corporation, Los Angeles, Calif.



You, too, can profit by using America's simplest, quietest and most efficient valves—flanged or standard types. Select from 5 springs for pressure desired, install—and that's all . . . no maintenance required.

NON-CHATTERING. PIPE sizes 1/4" to 2". Brass or cast iron.

For ram presses, machine tool hydraulic mechanism, Diesel and oil-burning equipment.

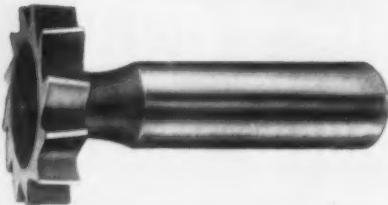
Write for professional copy — on your letterhead, please — of FULFLO MECHANICAL DATA BOOK.



THE FULFLO SPECIALTIES CO., Inc.
PUMP AND VALVE MANUFACTURERS
BLANCHESTER, OHIO

For more data circle 392 on Reader Service Card

new shop equipment . . .



Quality Stagger Tooth Keyseat Cutter

steel, and so on. The smooth cutting action, minimum chatter and unusual finish provided by the cutter is said to be particularly noticeable on hand operated machines, but is helpful on all machines. The free cutting action minimizes the danger of cutter breakage,

and the cutter is especially helpful in cutting large size keys. Special sizes can be made to order incorporating the stagger tooth design.

For more data circle 104 on Reader Service Card

★ ★ ★

POWER SCREW DRIVER CAN BE AUTOMATICALLY OR OPERATOR CONTROLLED

Designated as the Model 400, a power screw driver, which can be operator-controlled for certain work and then converted to fully automatic operation when required, has been announced by Shakeproof Division of Illinois Tool Works, 2501 N. Keeler Ave., Chicago 39, Ill. In a fully automated operation, the machine is said to be able to replace all of the operator's functions, including feeding and guid-

BEVERLY

Pneumatic

THROATLESS SHEAR

FASTER, EASIER CUTTING

to any Shape!

- Compactly built for maximum visibility and efficiency
- Operates on 35 to 150 PSI air pressure
- Adjustable power and return stroke length and speed

Beverly Pneumatic Shears combine all the advantages of Beverly Throatless Shears with fast, effortless cutting action through air cylinder operation. Air operation speeds work, permits accurate cutting to a pattern or template, as operator can concentrate on guiding work through the shear. Flow control valves permit precise adjustment of stroke speed; adjustable actuating arm controls stroke length. Foot Switch permits operator to use both hands on the work piece. Operates on 110V. 60 cycles AC and 35 to 150 PSI air pressure.

See your nearby Beverly Distributor

Write for catalog sheet and complete details.

BEVERLY SHEAR MANUFACTURING CO.
3000 W. 111th STREET • CHICAGO 43, ILLINOIS

For more data circle 393 on Reader Service Card





Holes, Contours, Surfaces

Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Co., Inc., 730 Union Ave., Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Fanto-Crush Wheel Dressers, Precision Rotary Tables, Motorized Centers and a complete line of Hole Location Accessories.

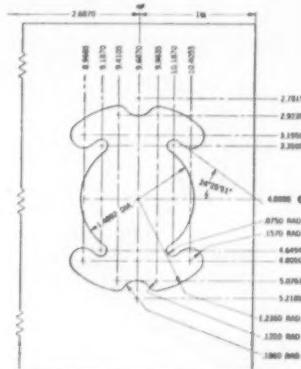
Why you should use the Jig Borer and Jig Grinder to inspect their own work

In more than 90 per cent of all cases, the Moore Jig Borer and Jig Grinder provide the most accurate and efficient means for inspecting their own work. The advantages include:

1. Considerable saving of time results from checking the piece in the original setup, while still in the machine. In addition, should an error be discovered—the work is in position for correction.
2. The same directness which reduced sources of locational error in comparison to toolmaker error also reduces the number of steps and sources of error in inspection.
3. The machine's measuring system is fully as accurate as any standard that might be used in its stead. The inspection values, determined by means of this system, are likely to be more accurate than those attained by any other shop standard because reorientation errors are eliminated.
4. The machine spindle provides a rotatable mounting for an indicator. Holes can be picked up directly in this manner, without use of plugs or pins. Out-of-roundness, often mistaken for out-of-location, is easily detected and identified. Full 360° rotation of spindle provides a double indicator reading of any error, thus increasing readability. By vertical movement of the spindle and indicator the shape of the hole can be explored, revealing taper, bellmouth or barrel shape.
5. Contours, one of the most difficult, time-consuming jobs of inspection, can be rapidly and accurately measured and inspected by use of the "indicator measuring" technique. The drawing at the right shows dimensions to be inspected on a complex contour. Of this job it might well be said, "How else would you inspect it?"
6. Work jig bored or jig ground to polar coordinates on the rotary table can be inspected to rectangular coordinates in the same setup. This not only provides a check on possible errors in settings; it eliminates sources of rotary table errors.
7. Paradoxically, the machines will actually inspect somewhat more accurately than they will locate, under most conditions. During inspection, both machine and work are

free of vibration, stresses and temperature differentials, so that the accuracy of the measuring system is undiminished.

8. A microscope, interchangeable with the indicator in the machine spindle, can pick up surfaces and small holes which cannot be conveniently reached with an indicator point.



Without modern methods, this contour presents a serious problem to inspect as well as to machine.

Get ALL the answers from this new, 424-page book

The information on this page is just a sample of the valuable, on-the-job aid you can get from Moore's all-new book, *Holes, Contours and Surfaces*. Tells you how to produce tools, dies and precision parts the modern way. 424 pages, 495 illustrations, 184 pages of Woodworth Coordinate Location Tables from 3 to 100 holes. Price only \$5 in U.S.A., \$6 elsewhere. Send check or money order to Moore Special Tool Co., Inc., 730 Union Ave., Bridgeport 7, Conn.



For more data circle 394 on Reader Service Card

new shop equipment . . .

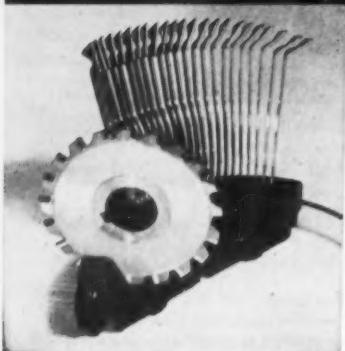
ing, controlling the length of the stroke, and automatically maintaining a pre-determined torque. Several of these machines can be set up to do multiple fastening jobs with only one operator controlling the entire battery.

When used with an operator in attendance, the Model 400 has many features that reduce operator fatigue

and increase efficiency. Where individual piece work is required, the machine eliminates individual screw handling, and protects the product from assembly damage. Workpieces can be handled quickly and placed accurately, because the operator has unrestricted use of both hands. The driving unit is detachable for use where space is limited or where center distance between screws is close.

The power screw driver is said to be capable of driving as many as 60 screws per minute. The manufacturer states that, in addition to achieving this high production rate, the machine reduces scrap loss and product damage, and is adaptable to many unusual operations. An example of this is running screws only part way in, so that wire or other

If You Can See It — You Can
SAW IT with a **GAY-LEE**



Slotting typewriter type bar segment.

"THINSAW"

Solve problems in high-precision slitting, slotting, sawing with Gay-Lee carbide-tipped Thinsaw! Wafer-thin for the most delicate work with positive alignment and rigidity that avoid run-out . . . but retaining the speed and long life of carbide. Patented construction holds tips firmly.



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- **DIAMETERS UP TO 12"**

Complete Line of Saws for Any Application—To Any Tolerance

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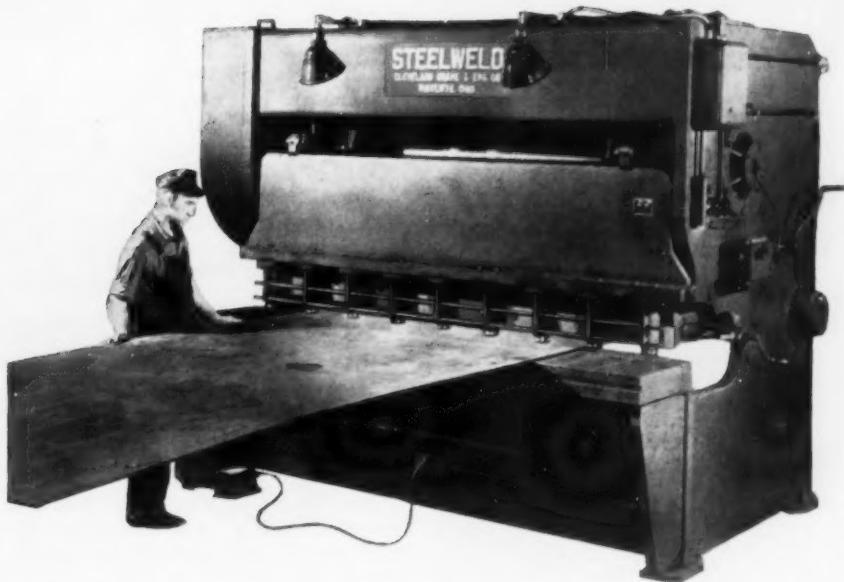
GAY-LEE
COMPANY

CLAWSON • MICHIGAN

For more data circle 395 on Reader Service Card



Shakeproof Model
400 Screw Driver



ALL STEELWELD SHEARS CONTROLLED ELECTRICALLY...

OPERATION of Steelweld Shears is unusually easy and convenient. There is no tiresome lifting of the leg to work a foot treadle. Slow, fatiguing knee action has been replaced by fast easy toe action.

A safety type electric foot switch is used. It can be slid around the floor wherever most convenient. It enables shearing speeds not attainable with foot treadles for certain cutting operations.

For instance, when cutting narrow strips from a long sheet, the operator can push the sheet at the end

and control the shear at the same time. He need not be near the machine. As the sheet becomes shorter he can move the switch along with his foot to always be within easy reach.

There is no extra charge for electrical foot control on Steelweld Shears — it is standard equipment on all size machines.

Steelweld Shears are radically different from all other shears with many outstanding features. Get the facts on these truly new and modern machines. Learn about the advantages they offer you.



GET THIS BOOK!

CATALOG No. 9011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

6403 EAST 282ND STREET

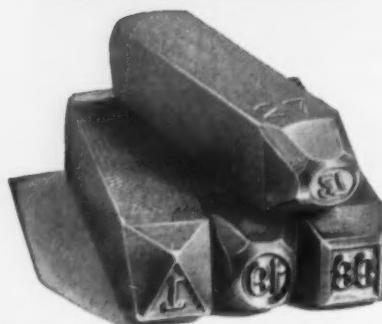
WICKLIFFE, OHIO

STEELWELD PIVOTED BLADE SHEARS

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new shop equipment . . .

INSPECTORS' and CODE SYMBOL STEEL STAMPS...



98 $\frac{5}{16}$ " 98 $\frac{1}{4}$ " 98 $\frac{3}{16}$ " 98 $\frac{5}{32}$ "
ACTUAL SIZE OF IMPRESSION

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IN YOUR PLANT . . . quick
identification of inspector, com-
pany or part supplier, machine
operator, shift, operation, etc.
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YOUR CUSTOMERS recognize your
inspection mark as a symbol of in-
sured dependability.

Identification numbers from (1) to (99), inside
standard $\frac{5}{16}$, $\frac{3}{8}$, $\frac{1}{4}$ and $\frac{3}{16}$ inch borders.
Special sizes and symbols on request.

Write for complete Catalog NM-51.

NEW METHOD STEEL STAMPS, INC.

147 Jos. Campau • Detroit 7

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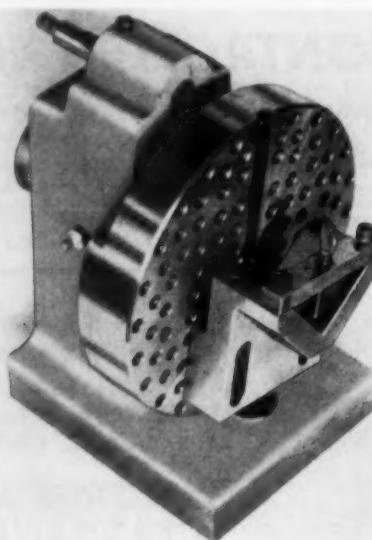
parts can be attached in a later stage of assembly. The motor, pulleys, drive belts, drive mechanism for the extra-large oscillating hopper, and other operating parts are enclosed in the streamlined crown housing to protect them from dirt and damage. The use of double steel posts provides rigidity, and reduces wear to vibration or improper alignment.

For more data circle 105 on Reader Service Card

★ ★ ★

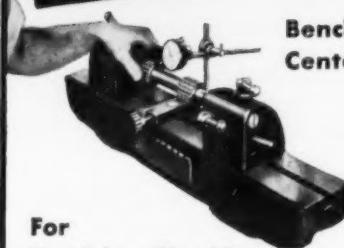
PRECISION TOOL FOR GRINDING VARIOUS TOOLS

The Whirl-Dex Co., 14847 Heyden, Detroit 23, Mich., has announced the improved Whirl-Dex with sine bar indexing, an effective precision tool for use in grinding various tools. The body is made of a meehanite casting with an



Whirl-Dex Tool with sine bar indexing

Time Saving Production and Checking Accessories



Bench Centers

For Precision Checking

Simplify assembly, lower spoilage and get better production from this modern Sundstrand Bench Center. You'll check work between centers easier, faster and within limits of .0001" on this improved Sundstrand Bench Center.

COMPLETE RANGE AS FOLLOWS:

6" x 18"	12" x 48"	24" x 48"
6" x 36"	12" x 60"	24" x 60"
12" x 36"	12" x 72"	24" x 72"

Balancing Tools For Small Medium or Large Work



Sundstrand offers a complete line of balancing tools which will save their cost quickly on truing or balancing operations. Accurately sensitive and durable, they provide a simple, reliable means

Here are three Sundstrand accessories that may prove helpful in your work. A wide range of bench centers and balancing tools are available for checking purposes. The automatic index base has proved a sound addition to many metal working machines. Write for further information.

for checking the balance of parts like gears shafts, fly wheels, pulleys, etc. Standard swing sizes range from 21 inches up to any swing desired. Length between standards ranges from 20 inches to any length desired.

Automatic Index Base For More Production



This automatic index base is designed so there is no strain against the index plunger during the cut. The base is locked by powerful clamping so that accuracy of index is not affected by heavy cuts.

In many cases, the addition of this Automatic index base has increased milling production enough to eliminate need for the purchase of additional machinery. It may be the answer to your milling production requirements. Call in a Sundstrand engineer. There is no obligation for this.

Free Data

Complete specifications are available on these three time saving accessories. Write for your copies today. Ask for bulletin 563.



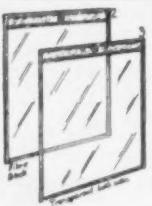
SUNDSTRAND MACHINE TOOL CO.

2339 ELEVENTH ST. ROCKFORD, ILLINOIS, U.S.A.

For more data circle 398 on Reader Service Card

new shop equipment . . .

oil hardened tool steel base and having hardened steel bushings, lapped to insure accuracy and smooth running. The spindle, which is also lapped, has only 0.0001 inch clearance between their surfaces. The face plate is 6½ inches in diameter and is bolted to the spindle



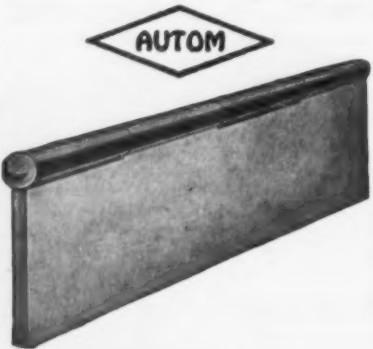
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1114 E. 87TH ST. CHICAGO 19

For more data circle 400 on Reader Service Card

hub which is also lapped so as to locate the face plate concentrically to the axis of the spindle. The back face of the face plate has 24 equally spaced holes on a 6-inch circle, providing 15-degree spacing. For any other spacing and accurate indexing, a secondary plate, which acts as a 3-inch sine plate rotating on the axis, insures indexing of any angle to an accuracy of approximately 0.0001 inch error in 3 inches. According to the manufacturer, 1,296,000 different angle combinations are now possible without changing face plates.

One of the features of the Whirl-Dex unit is a keyed adjustable 90-degree square locator. Through the use of the locator, square blocks with diameters extending from its face can be accurately positioned and ground without the use of centers. By properly positioning of locator surfaces tools can be located in the nest which is formed and then ground parallel and square, maintaining concentricity to within 0.0001 inch total indicator reading.

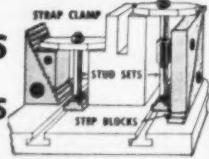
For more data circle 106 on Reader Service Card



REVERSIBLE SCREW DRIVER AND SPEED REDUCER FOR POWER DRILLS

Identified as the Versamatic Professional Model No. 4000-P, a reversible screw driver and speed reducer for use on power drills has been announced by

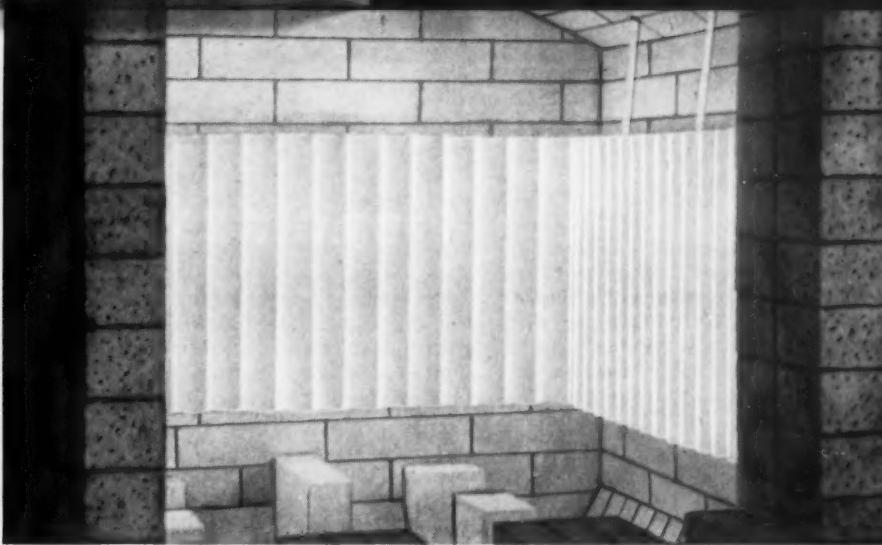
SURE GRIP STEP BLOCKS
STUD
SETS
STRAP
CLAMPS



DEPT. SB-1

TIETZMANN TOOL CORPORATION
ENGLEWOOD • OHIO

For more data circle 401 on Reader Service Card



THIS IS LINDBERG'S *New* ELECTRIC ELEMENT

Here is a photograph of Lindberg's new CORRTHERM element for electric heat treating furnaces. You can see how radically advanced this new element is over anything now used.

Wherever electricity is the preferable source of heat for metal treating the CORRTHERM element now makes its use practical, efficient and economical.

And this includes carburizing and carbonitriding furnaces, too! Problems created by the use of electricity in these types of furnaces are eliminated by CORRTHERM elements. These facts tell you how and why:

LOW VOLTAGE: Operates at extremely low voltage. No leakage through carbon saturation.

ATMOSPHERE CIRCULATION: Elements act as baffles to direct circulation of convection streams.

SAFETY: Extremely low voltage eliminates shock or short hazards.

DURABILITY: Watts density at all-time low. Elements practically indestructible. Work load or operator's charging tool can't hurt them.

EASILY INSTALLED: Element is not enclosed, just hangs in furnace. No complicated mountings required.



Find out how CORRTHERM, Patent No. 2694740 (other patents pending) can be applied to your heat treating processes. Get in touch with your Lindberg Field Representative. (See classified phone book.)

LINDBERG ENGINEERING COMPANY

2469 West Hubbard Street, Chicago 12, Illinois
Los Angeles Plant: 11937 Regentview Ave., at Downey, California

new shop equipment . . .

Supreme Products, Inc., 2222 S. Calumet Ave., Chicago, Ill. The unit attaches to any power drill and reduces the speed 7 to 1 by means of a planetary gear system. By one simple twist, the unit will run in reverse at a 6 to 1 reduction. In the forward driving motion, there is a 7-time increase in

torque; in reverse, there is a 6-time increase in torque.

The Versamatic is used for driving or removing screws, nuts, bolts, and so on. By a unique arrangement, a $\frac{1}{2}$ -inch taper chuck can be attached to the tool, thus making it an excellent speed reducer for heavy-duty drilling. Likewise, the unit is a fine tapping tool. Reversability enables the operator to remove the tap by power when tapping is completed. The unit is designed to be connected directly to the spindle of any portable drill, or may, with adapter furnished, be attached directly

into drill chuck.

The Professional Model No. 4000-P is packaged in a heavy-duty metal-edged box and is supplied complete with 14 accessory parts. There are three sizes of screw driver bits, three Phillips



Buy C/R Jawhead hammers, mallets, mauls from your local industrial supplier, or write for illustrated folder.



CHICAGO RAWHIDE MFG. CO.

1233 Elston Ave. Chicago 22, Illinois

IN CANADA:

Distributed by Super Oil Seal Mfg. Co., Ltd.,
Hamilton, Ontario

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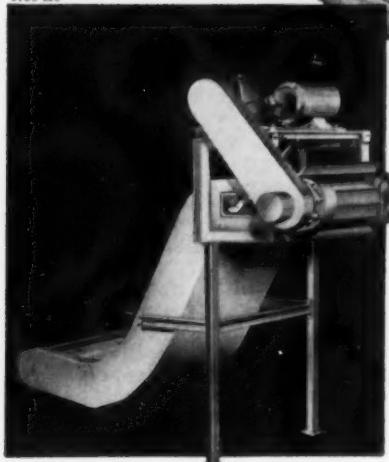
C/R
CHICAGO
RAWHIDE

Supreme Versamatic
Professional Model
No. 4000-P Reversible
Screw Driver
and Speed Reducer



**NO
Down Time
FOR SCRAP
REMOVAL**

8764-MF



The MAY-FRAN CHIP-TOTE is available in a wide range of sizes fabricated from standard components.

MAY-FRAN
ENGINEERING, INC.

For more data circle 404 on Reader Service Card

April, 1956

1708 Clarkstone Road
Cleveland 12, Ohio

modern machine shop 255

**REMOVE CHIPS, TURNINGS AND
BORINGS AUTOMATICALLY
WITH THE
MAY-FRAN CHIP TOTE®**

You keep men and machine tools producing and avoid manual scrap handling when you install MAY-FRAN CHIP-TOTE automatic scrap conveyors.

CHIP-TOTES can be furnished for use on any standard multiple-spindle or automatic machine tool. Operating speed can be synchronized to specific job requirements.

By reducing clean-up time at the day's end and eliminating down time for scrap removal, MAY-FRAN CHIP-TOTES quickly pay for themselves. Be sure to obtain the complete story on the cost-saving CHIP-TOTE.

For complete information write for Catalog MF-640



new shop equipment . . .

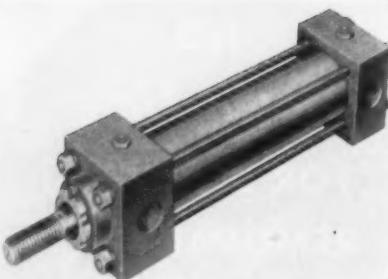
type bits, a finder bit, two adapters for socket sets, and all the necessary servicing tools.

For more data circle 107 on Reader Service Card



NON-ROTATING, DOUBLE-ACTING, SQUARE-END CYLINDERS

Logansport Machine Co., Inc., 801 Center Ave., Logansport, Ind., has announced a line of non-rotating, double-acting, square-end cylinders, identified as Ultra-mation cylinders. Previously, this cylinder has been built only as special for unusually difficult high-production jobs. Basic specifications are as follows: five bore sizes from 2 to 6 inches; pressures to 150 p.s.i. air and to 500 p.s.i. oil; five basic mountings



Logansport Heavy-Duty Ultra-mation Cylinder

(foot, trunnion, flange, clevis and pivot) with interchangeable covers permitting multiple mounting combinations; covers, both front and blind end are of heavy steel plate; piston rods are extra-heavy to carry high impact loads and have highly polished surfaces to assure minimum friction and maximum packing life; rod wipers are of durable synthetic rubber, assuring dirt-free rod on



MONEY-BACK TRIAL OFFER
Order a trial gallon of each today for testing in your shop. We'll cancel the bill if you're not satisfied.

cut weld cleaning time by 85%

Throw away your cold chisel and whisk off weld spatter with a dry rag! Protect-O-Metal spatter-proofing compounds make weld cleaning a breeze. Improve your welds at the same time . . . P-O-M compounds quiet the arc, improve fusion and electrode operation, prevent oxidation and annealing scale, cause no porosity. No smoke, odors, or fumes.

P-O-M No. 2. Non-inflammable, non-toxic, water-soluble paste. Inorganic. Thin before applying and start welding at once. \$3.30 per gallon, f.o.b. Dayton.

P-O-M No. 8. Rust- and corrosion-resistant resin base compound. Comes ready to use. Safe for all metals. Good paint primer; permits outdoor storage of subassemblies. \$3.35 per gallon, f.o.b. Dayton.

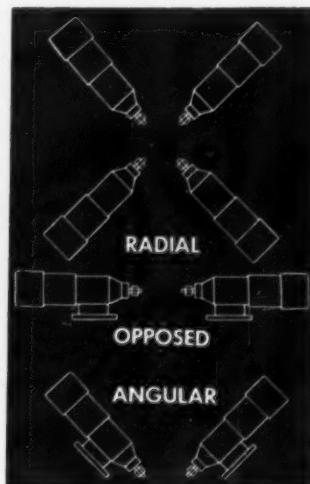
PROTECT-O-METAL

G. W. SMITH & SONS, INC.

5407 KEMP ROAD, DAYTON, OHIO

For more data circle 405 on Reader Service Card

BUILD YOUR OWN AUTOMATIC DRILLING OR TAPPING MACHINE



With Govro-Nelson Automatic Drilling and Tapping Units, together with the bases and electrical controls which we can supply, you can build yourself an automatic drilling or tapping machine at substantially lower cost than a special machine.

Any number of units may be employed. Examples of the various ways in which they may be arranged are shown at the left.

The Drilling Units are made in several sizes with spindle speeds from 1100 to 3450 RPM. Drill Units have full Hydraulic Control with external adjustment for the rapid approach, the rate of feed and the length of stroke. Suitable for drills up to $\frac{3}{8}$ ", depending on material.

The Tapping Units are available in two sizes with 550 and 1725 RPM spindle speed. Features include no clutch and no lead screw and automatic adjustment for various leads. Suitable for tapping 0-80 to $\frac{3}{8}$ -16, depending on material.

Write for Literature

GOVRO-NELSON CO.

Machinists of Precision Parts for 33 Years

1933 Antoinette
Detroit 8, Mich.

Automatic DRILLING UNIT

For more data circle 406 on Reader Service Card

new shop equipment . . .

instroke; cylinder tubes are hard-drawn and corrosion-resistant for low friction; pistons are of high-quality steel construction; ports are adequate size, are unobstructed and can be re-located to any 90-degree position by rotating cylinder covers; tie rods are extra-heavy to resist shock loads and

to maintain proper tension on cover gaskets. Cushioning is available for either or both cylinder ends.

For more data circle 108 on Reader Service Card

★ ★ ★

TURNING AND CHAMFERING TOOLS USE INDEXABLE INSERTS

Twenty sizes and styles of RH and LH 30 and 45 degree turning and chamfering tools using

slug-type indexable inserts in band-type Multicut toolholders have been announced by Wesson Co., 1220 Woodward Heights Blvd., Ferndale 20, Mich. Classified as semi-standards, the tools incorporate standard low cost replaceable parts similar to those used on other standard Multicut holders. The tools are designated as the Models SDR, SDL, SER and SEL. The holder design permits insert adjustment and indexing without removing the holder from the machine. By using square inserts, eight cutting edges are provided before any insert grinding is required.

While primarily designed for

*Look into the complete, cost-cutting LOVEJOY line.
Standard tools are in stock — to help you
increase production, save time and money now!*

INSERTED-TOOTH MILLING CUTTERS

Face, side, end, slotting and boring mills.

H.S.S., CARBIDE, ALLOY BLADES

Interchangeable in all Type "A" milling cutters from 4½" to 24" in diameter.

NEW! SET-SCREW TYPE END MILLS

And new Type "Z" slotting cutters provide maximum axial and radial adjustment.

Boring Tools • Arbors • Flywheels
Lovejoy Milling Cutter • Assembly Gage

Special cutters are a Lovejoy specialty

Write for new catalogs: No. 31 (Face Mills),
No. 32 (Side Mills), No. 33 (Arbors).

130 MAIN ST., SPRINGFIELD, VERMONT

**Send for free
SPEED & FEED
CALCULATOR**

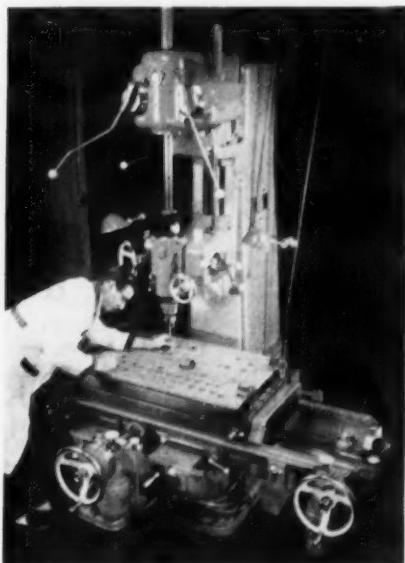
**LOVEJOY
TOOL COMPANY, INC. *Ltc***
SPRINGFIELD, VERMONT, U.S.A.

For more data circle 407 on Reader Service Card

BUY Precision **THAT FITS...!**

for tenths

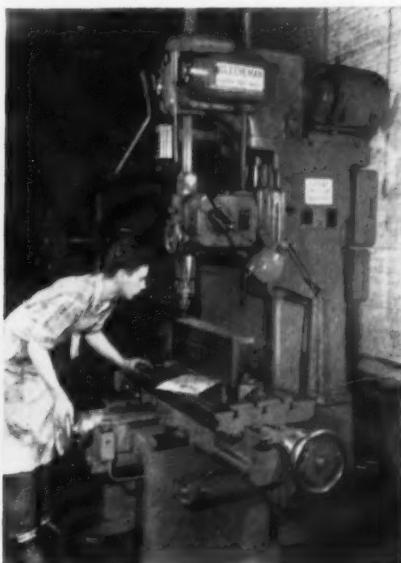
**YOU NEED A
CLEEREMAN JIG BORER**



OR

for .001" / foot

**YOU NEED A
LAYOUT DRILLING MACHINE**



If your work involves gages, jigs, fixtures, or "jigless" production with ultra-fine tolerances, one of the three models of Cleereman Jig Borers is the answer.

But when your work calls for tolerances of .001" per foot, the economy of the Layout Drilling Machine is the "common sense" approach to your problem.

There are installations near you. Your Cleereman distributor can answer your questions and arrange an inspection visit for you.

BRYANT
Machinery & Engineering
• Company •
General Office
440 West Washington Blvd., Chicago 6
Representatives in Principal Cities

CLEEREMAN MACHINE TOOL CORP.
GREEN BAY, WISCONSIN

For more data circle 408 on Reader Service Card

new shop equipment . . .

chamfering, the tools are also suitable for turning operations. The 45 degree tool, for instance is particularly useful where turning is up to a 45 degree shoulder. Like all band-type Multicut tools, the new styles lend themselves to increased tooling efficiency in either multiple tool or single tool setups. The

inherent rigidity of these holders makes them well suited for heavy-duty, as well as light duty, stock-removal operations. For more data circle 109 on Reader Service Card



HORIZONTAL STOCK REEL IS EASY TO LOAD

Durant Tool Supply Co., 136 S. Water St., Providence 3, R. I., has announced a horizontal stock reel which is designed for easy loading.

By turning a handle, the entire guiding mechanism swings so that the coil can be easily placed on the platen; no disassembling of the reel is necessary. The platen is solid and can be used as a lubricant reservoir. According to the manufacturer, the reel is unusually stable due to the offset leg on the

Did you know that - - -

Several of your home appliances probably were gaged with Comtorplug



Precision Internal Gage

SIZES FROM
 $\frac{1}{8}$ " to 8"
AND LARGER



COMTORPLUG with interchangeable expanding plugs to gage simple or special bores from $\frac{1}{8}$ " to 8" dia.

Unique Advantages

- Positive gaging accuracy to fraction of .0001" regardless of who operates it.
- Indicates actual size, a fixed—not passing—reading.
- Positive 2-point gaging—automatic centering.
- Shallow holes, deep holes, inside splines, open-end holes gaged easily.
- Detects ovality, back or front taper, bell mouth, barrel shape.
- Reaches to bottom of blind holes.
- Gages work while still held in chuck.
- A shop tool for all-day every day use.
- Portable—no wires, hoses or stands.

Investigate the gage used by the thousands in jet engine, automotive transmission, household appliance, farm machinery, guided missile and other volume-precision plants. IT MAKES PRECISION GAGING EASY . . . at machine . . . at inspection bench . . . for selective assembly. No other like it—investigate and see why.

COMTOR COMPANY

64 Farwell St.
WALTHAM 54,
MASS.

GET THE FACTS—
REQUEST BULLETIN 49



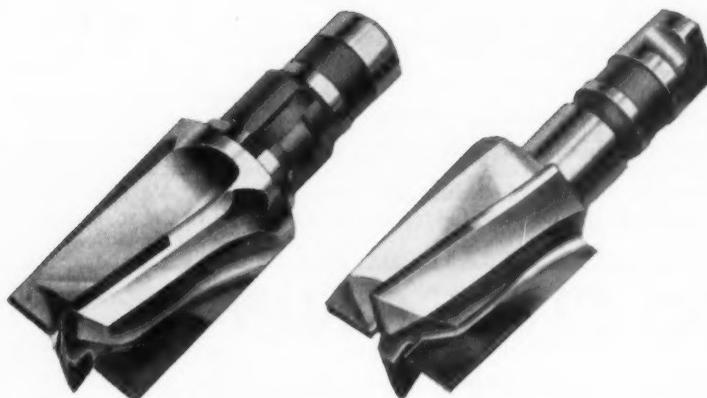
For more data circle 409 on Reader Service Card



View of Durant Horizontal Stock Reel

NOW!

A
COMPLETE LINE
OF STANDARD
CARBIDE TIPPED
COUNTERBORES



Standard tungsten carbide tipped cutters in both Pin and Radial Drive are now carried in stock for immediate shipment. Diameters range from $\frac{3}{8}$ " to 2" in $\frac{1}{16}$ " sizes, and from 2" to 3" in $\frac{1}{8}$ " sizes.

Improved flute design provides better chip disposal and longer carbide tips insure longer tool life. Minimum root diameters permit the use of a greater range of standard Eclipse Pilots.

We also carry a complete stock of High Speed Steel Counterbores, Countersinks, Inverted Cutters and Core Drill Cutters, as well as holders and pilots. Special Carbide Tipped and High Speed Steel Tools in various drives will be quoted promptly on request.



ECLIPSE COUNTERBORE COMPANY
1600 BONNER AVE., DETROIT 20, MICHIGAN

For more data circle 410 on Reader Service Card

new shop equipment . . .

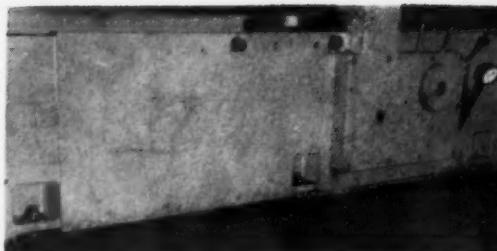
base. The adjustable guide on the top of the reels makes it possible to place the reel close to the press. The horizontal stock reel is available in four sizes; namely, the Model DC-1 with a 24-inch capacity, the Model DC-2 with a 30-inch capacity, the Model DC-3 with a 36-inch capacity and the Model DC-4 with a 40-inch capacity.

For more data circle 110 on Reader Service Card

★ ★ ★

MACHINERY INSTALLATION PADS REDUCE NOISE AND VIBRATION

Designed to reduce noise and vibration to a minimum, a line of pads for use in installing practically all types of machinery in plants, factories, and so on, is now being offered under the

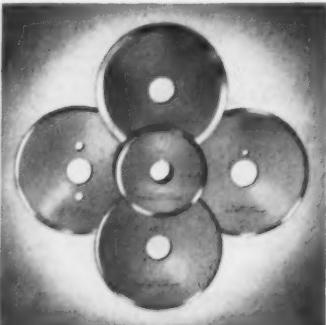


**Close-up view of the base of a grinder
mounted on Air-Loc Installation Pads**

name of Air-Loc by Clark, Cutter, McDermott Co., Franklin, Mass. The accompanying illustration shows the base of a heavy grinding machine where Air-Loc pads are used in conjunction with steel plates and leveling screws. As noted, each leveling screw rests on a steel plate which, in turn, rests on an Air-Loc pad.

According to the manufacturer, Air-

100 CUTS ONLY ►►



CONTINENTAL

CUT-OFF WHEELS FOR PIPES & TUBES

Precisely tempered steel for long life—more cuts between sharpenings. Bevels available for every cutting problem. Fit Continental and all other rotary Cut-Off Machines. They're profitable—try them and prove it to yourself. Request Catalog today.

**REQUEST YOUR
CONTINENTAL
CATALOG TODAY**

Continental MACHINE CO.

SINCE 1919

1932 N. MAUD AVE. • CHICAGO 14, ILL.

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LIKE A
45 AUTOMATIC

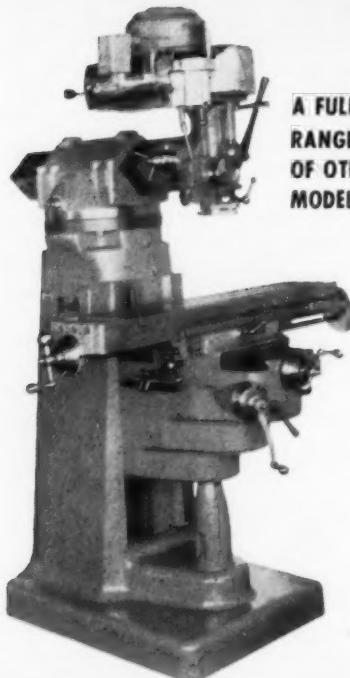
-this NEW "45"
INDEX 45 MILL

has the "CALIBER" and "ACCURACY"

to do your

**MILLING, DRILLING
and BORING JOBS**

.. BETTER, FASTER AND
MORE ECONOMICALLY!



A FULL
RANGE
OF OTHER
MODELS.

The big caliber derives from the sliding overarm—The unique square design of this overarm gives much more rigidity with its resultant greater accuracy—It provides extra range and capacity—More usable working space—More versatility in set-up—More power at the cutter. No adjustment required on overarm and head after use, and no need to re-indicate head after moving overarm. Speed range with 9 changes makes possible the use of high speed or carbide tipped cutters to the best advantage. Many other important features.

Write for Literature.

Index Machine Co.

544 N. MECHANIC STREET

JACKSON, MICHIGAN

For more data circle 412 on Reader Service Card

**HIGHER SPEEDS!
FASTER GRINDING!**

kipp

AIR GRINDERS

MODEL JA
50,000 R.P.M.

\$42.00
IN U.S.A.



Weight 12 ounces;
length 6½ inches;
chuck size ½ inch.
Wheel guard removed
for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.

kipp

MADISON-KIPP CORP.

208 Waubesa St., Madison 10, Wis., U. S. A.
For more data circle 413 on Reader Service Card

new shop equipment . . .

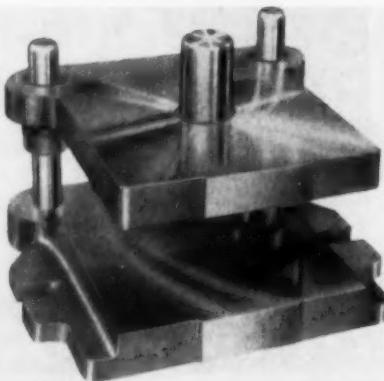
Loc installation pads in all instances eliminate the need for bolting or cementing of machines to the shop floor. For more data circle 111 on Reader Service Card

★ ★ *

DIE SETS AND DIEMAKERS' SUPPLIES

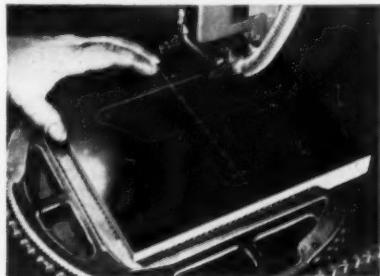
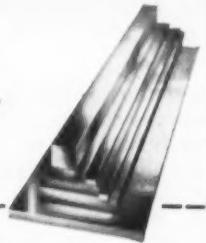
Danly Machine Specialties, Inc., 2100 S. Laramie Ave., Dept. G, Chicago 50, Illinois, has announced a complete new "Leadership Line" of die sets and diemakers' supplies. According to the manufacturer, the new line makes available a more complete selection of die sets and supplies with a higher degree of uniform and dependable accuracy and with a longer service life than any previously offered by the firm. The new Danly precision assembly-line methods of manufacturing also permit faster service on all of these various new products.

The new die sets offer eight major advantages to diemakers. (1) Precision lapped chrome-plated guide posts are standard equipment in all precision die



Typical Danly "Leadership Line" Die Set

Up to 50% Greater Life from Tools, Dies, Punches, Gages and Parts!



Ink it—mark it—saw it



No distortion when heat treated.



NEW! Spray-on steel
ink for layout work. Fast,
easy, economical. Ask
for literature.

TS-15

... with DoALL Air Hardening Steel

Longer lasting. A high chromium content (5%) combined with molybdenum and vanadium makes this a longer lasting tool steel giving up to 50% more wear life than oil hardening tool steel.

Greatest selection of sizes available for immediate delivery. Less waste; pieces are available to meet almost any size requirement. (Special sizes can also be furnished promptly.)

Precision ground and accurate. 25 micro inch RMS surface finish. All sides and edges are ground to these tolerances: thickness—plus or minus .001"; width—plus .005" minus .000"; edges square to face of bar within 10 minutes of a degree.

Call your local DoALL Service Store for swift delivery of DoALL Air Hardening Tool Steel. **Over 1000 standard sizes in air and oil hardening steel to choose from.**

Literature available, write for it.

The DoALL Company
254 N. Laurel Ave. Des Plaines, Ill.



Machine Tools • Saw Bands • Measuring Instruments • Cutting Tools In Stock

For more data circle 414 on Reader Service Card

new shop equipment . . .

sets in the line. These "Microme" guide posts are chrome plated to provide unusually high resistance to wear. (2) Demountable bushings are available as an optional feature on all precision die sets. Steel shoulder bushings prolong die set life. Oil fittings are positioned

so that they can be easily reached from the front or side of the press and will not interfere with die regrinding or other adjustments. Figure eight oil grooves distribute a dependable oil film between the guide posts and bushing surfaces. (4) A complete new line of long and short shoulder precision bushings of hardened steel, plus shoulder bushings of special-alloy hard bronze, are available. (5) A simple clamping method for die sets which have a right or left die area dimension of 20 inches or more is utilized. (6) Removal of punch holder during die making, die setting and regrinding has been made easier by making one guide post $\frac{1}{2}$ -inch longer than the other. (7) The precision die sets now meet or exceed all A.S.A. standards. They are also available in a broad range of sizes not listed by A.S.A. (8) All four horizontal surfaces, including the top of the punch holder, are ground to a high finish to attain the highest possible degree of accuracy in positioning the die sets. The top surface of the punch holder is vented.

For more data circle 415 on Reader Service Card

G E A R S
In Stock—Immediate
Delivery

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send in your blueprints and inquiries.

Send for Complete Catalog No. 20
CHICAGO GEAR WORKS
440-50 N. Oakley Blvd., Chicago 12, Ill.

For more data circle 415 on Reader Service Card

SPRING LOADED LIVE CENTER



Eliminate excessive overhang of your center. Use the accurate, rugged, reliable *NIROL. The spring loaded Live Center that compensates for expansion and contraction in actual operation.

Write
for complete
information.

*Reg. U.S. Pat. Off.

*** NIROL** MANUFACTURING COMPANY

901 H'WAY 22, N. PLAINFIELD, N. J.

For more data circle 416 on Reader Service Card

TORQUE-SCREW DRIVER FOR SQUARE GAGE BLOCK ASSEMBLIES

An important addition to its recently announced line of square gage blocks



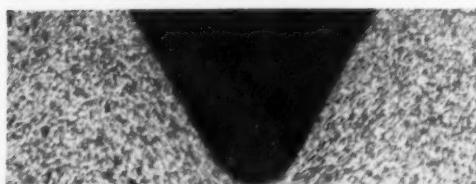
DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS
Wilmertding, Pa.

For more data circle 417 on Reader Service Card

Up to 40% higher tightening torques— a feature of new High Torque Unbrako socket set screws

SCREW SIZE	UNBRAKO	RECOMMENDED SOCKET SET SCREW TIGHTENING TORQUES (Inch-Pounds)		MINIMUM DIFFERENTIAL %
		SET SCREW S	SET SCREW C	
#4	5	3.9	3.5	28
#5	9	7.8	7.4	15
#6	9	7.8	7.4	15
#8	20	14.7	14.5	36
#10	33	26.5	25	25
1/4	87	62	60	40
5/16	165	122	125	32
3/8	290	198	225	29
7/16	430	309	350	23
1/2	620	460	500	24
5/8	1225	1106	1060	11
3/4	2125	1540	1800	18
7/8	5000	3660	4600	9
1	7000	5025	6500	8



UNBRAKO SET SCREW THREADS



ORDINARY SET SCREW THREADS

Compare UNBRAKO-recommended tightening torques with those of ordinary socket set screws and you readily see why you can set an UNBRAKO and then forget it. The reasons are simple. UNBRAKOS have deeper sockets, which give you better purchase with the wrench; rounded socket corners, which eliminate the sharp corners where cracks start; fully formed threads, which make them stronger; and knurled cup points, which keep them tight.

Let's see just how the development of fully formed threads make the new High-Torque UNBRAKO stronger. The metal is compressed into the closely knit grain structure that you see in the illustration. The grain flow follows the contour of the threads. There are no straight lines along which shear can occur. An UNBRAKO retains its flow lines even when ground down to .010" below root diameter. Conversely, cut or ground threads have straight flow lines—lose thread form at root diameter.

You can't buy a better screw than an UNBRAKO. And you can't get full *high-torque* performance without a "High-Titan" UNBRAKO Hex Key—the high-ductility, precision internal wrenching tool. See your authorized distributor today. Or write STANDARD PRESSED STEEL CO., Jenkintown 22, Pa.

UNBRAKO ® SOCKET SCREW DIVISION

STANDARD PRESSED STEEL CO.

SPS
JENKINTOWN PENNSYLVANIA

For more data circle 418 on Reader Service Card

new shop equipment . . .

and system of accessories, a specially designed torque screw driver has been introduced by The DoAll Co., Des Plaines, Ill. Under most existing systems for assembling square gage blocks into working gages, tie rods are passed through the holes in the center of the blocks and the stack is clamped by

means of screws which fit internal threads at each end of the tie rods. Tightening the screws with an ordinary screw driver has often led to inconsistency in dimension, since the ultimate clamping pressure is dependent upon the unreliable element of "feel." Too much pressure is said to cause distortion of the gage blocks with consequent errors in dimension beyond the rated tolerance of the blocks.

The driver for square gage block assemblies "slips" at a fixed torque. When used to tighten tie rod screws in a stack of square gage blocks it develops a pressure which has been established by laboratory test as sufficient to maintain a rigid assembly of wrung blocks but is, at the same time, not great enough to cause distortion. Because direct clamping pressure

WORLD'S HARDEST METAL

• New, improved TALIDE METAL is uniform in quality—gives top performance on ALL cutting, drawing and wear-resistant applications. Write for Catalog 56-G. METAL CARBIDES CORP., Youngstown 12, Ohio.

DIES ROLLS TOOLS BAR STOCK

METAL CARBIDES CORPORATION
TALIDE®
YOUNGSTOWN 12, OHIO

HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • CERMETS • HIGH TEMPERATURE ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

For more data circle 419 on Reader Service Card

DoAll Torque Screw Driver being used



when mistakes happen...



Automotive crankshaft being brought up to inspection standards with metallizing. This automotive manufacturer formerly used plating for this type of salvage, worked one per hour. With metallizing, the salvage operation requires only 5 to 10 minutes per shaft, including surface preparation.

...and they do in any busy machine shop, there's no need to scrap a mis-machined or otherwise damaged machine part that represents an investment of many expensive man-hours.

Parts like these are brought up to inspection standards quickly, easily and inexpensively with metallizing.

And with the new molybdenum metallizing wire, Sprabond, the only surface preparation required is cleaning. The molybdenum forms a molecular bond with the surface being rebuilt. Little heat is generated, eliminating any danger of warpage.

What's more—users have found that the extreme hardness of the molybdenum coating, and its microscopic porosity which provides superior lubricating characteristics, improve its "wear-ability" over ordinary bearing surfaces as much as 25 times. You haven't just salvaged a part—you've improved it.



Free Bulletin

Get the full story on metallizing in production salvage. Bulletin 57-C describes and illustrates the procedures, provides data on typical parts, with interesting photo-micrographs showing the unique bonding action of Sprabond Wire. Send for a copy.

The trade name, SPRABOND WIRE, is the property of Metallizing Engineering Co., Inc.

DON A. WATSON
METALLIZING ENGINEERING CO., INC.
1111 Prospect Ave., Westbury, Long Island, N. Y.
 Please send me Bulletin 57-C.
 Please have Metco Field Engineer call.

Name _____

Company _____

Street _____

City _____ Zone _____ State _____



Metallizing Engineering Co., Inc.

1111 Prospect Ave., Westbury, L. I., New York • cable: METCO
In Great Britain:
METALLIZING EQUIPMENT COMPANY, LTD.—Chobham near Woking, England

For more data circle 420 on Reader Service Card

new shop equipment . . .

sufficient to wring the blocks would result in distortion, the torque screw driver is intended for use after the blocks have been clean and wrung by hand in the accepted manner. This procedure of assembling the blocks, plus the use of the torque screw driver is



Specializing in Stainless Steel
Standard and Made to Order Precision Parts
Send Your Blueprints for Prompt Quotations

PEASLEE METAL PRODUCTS CO.
470 Tolland St.
EAST HARTFORD, CONN.

For more data circle 421 on Reader Service Card

said to make it possible to achieve consistent repeat accuracy in assembling and re-assembling stacks of the same dimension.

Ruggedly constructed for long life, the torque screw driver features a hardened and chrome plated nib. Turned clockwise, the screw driver applies the proper pressure to the assembly—counter-clockwise, the nib locks to the knurled handle so that the clamping screw may be loosened. The driver is designed for use with any of the standard square gage block accessory systems.

For more data circle 113 on Reader Service Card

★ ★ ★

DUAL ELECTRIC INDICATOR MEASURES SWIVEL TABLE ADJUSTMENT

To provide accurate control for grinding close tolerance tapers, Norton Co., Worcester, Mass., has developed the "Swivalign" Dual Electric Indicator for measuring swivel table adjustment. This device, applicable to Norton cylindrical and universal grinding machines, simplifies the adjustment of swivel tables to correct errors in grinding exact tapers or to eliminate taper in straight work. It consists of one electrical pick-up unit with zero adjusting knob at each end of the swivel table and a two channel amplifier having a pair of indicating meter elements

A large hand is shown holding a small transfer screw set. The text above the hand reads "You Need an Extra Hand Now to Speed Up Production!" Below the hand is the company name and address.

HEIMANN TRANSFER SCREW SETS

IN 11 SIZES—No. 6 to 1" N.C. in all S.A.E. sizes.

HEIMANN MFG. CO. • URBANA, OHIO

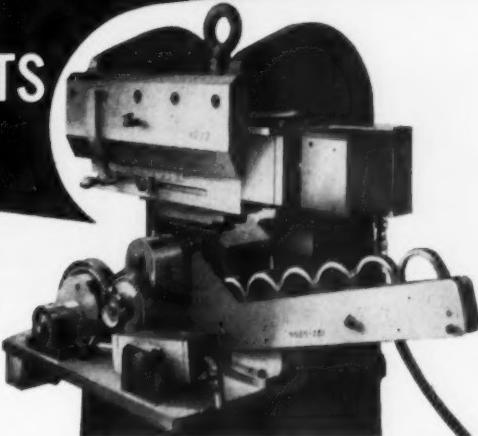
Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!

For more data circle 422 on Reader Service Card

YOU CAN CUT MARKING COSTS WITH...



GEO. T. SCHMIDT AUTOMATIC FEEDS



In many applications, thousands of components per hour are marked, with GTS automatic marking equipment. Feeding mechanisms are designed for a specific operation, custom tailored to suit your requirements.

Perhaps GTS specialists can design automatic equipment to solve your marking problems.

A trained marking engineer is at your disposal to help you modernize your marking operations and cut costs to a minimum.



MODEL 175 HYDRAULIC



The unit illustrated above marks the periphery of bearing races at the rate of 2400 to 3000 per hour. It is fed directly from automatic screw machines, and requires no operator.

IF IT'S WORTH MAKING, IT'S WORTH MARKING.

GEO. T. SCHMIDT, INC.

1806 West Belle Plaine Avenue
Chicago 13, Illinois

For more data circle 423 on Reader Service Card

new shop equipment . . .



Norton "Swivalign" Dual Electric Indicator Setup on a Type V-4 Universal Grinder

reading on a common scale. Each meter needle responds to movements of only one of the pick-up elements. Connections are so arranged that both needles move in the same direction of rotation as the swiveling of the table. Thus if the table is swiveled clockwise (as viewed from above) the needles rotate clockwise and vice versa.

Divisions on the meter scale indicate directly taper changes in thousandths of an inch per foot of taper. Two ranges of readings, one for extremely accurate settings with graduations of 0.0001 inch per foot and the other 0.0005 inch per

foot of taper change are provided. The desired range is obtained by a selector switch on the front of the instrument case. A conversion chart on the side of the instrument case gives taper foot values for corresponding micrometer readings of work diameters.

For more data circle 114 on Reader Service Card

★ ★ ★

SLIDE CHART SIMPLIFIES SELECTION OF DRILL BUSHINGS

A pocket-size slide chart which instantly calculates the proper drill bushing for a given drill size has been announced by Universal Engineering Co., Frankenmuth 9, Mich. The plastic slide chart is extremely practical, carrying selection data for all types and sizes of drill jig bushings up to 1 $\frac{3}{4}$ -inch drill size.

The selector is divided into four areas, one for each of the four types of bushings. In selecting the area for the type bushing you want, you move the slide until the correct drill size appears in the drill-size window. All other factors now appear in their proper windows. One shows correct bushing o.d. and dimensions from center to flat for clamp. Another shows the radius for lock screw. Every factor needed for the jig design, as well as for ordering the correct bushing to fit that design, is shown exactly, at a glance. An engineer specifying jig designs can obtain one of



Hardened and Ground Tool Holder Bushings

These new tool holder bushings are hardened and ground and priced lower than conventional soft bushings. Most sizes in stock for prompt delivery. $\frac{3}{4}$ " to $3\frac{1}{2}$ " O.D.—any bore. Send for descriptive literature.

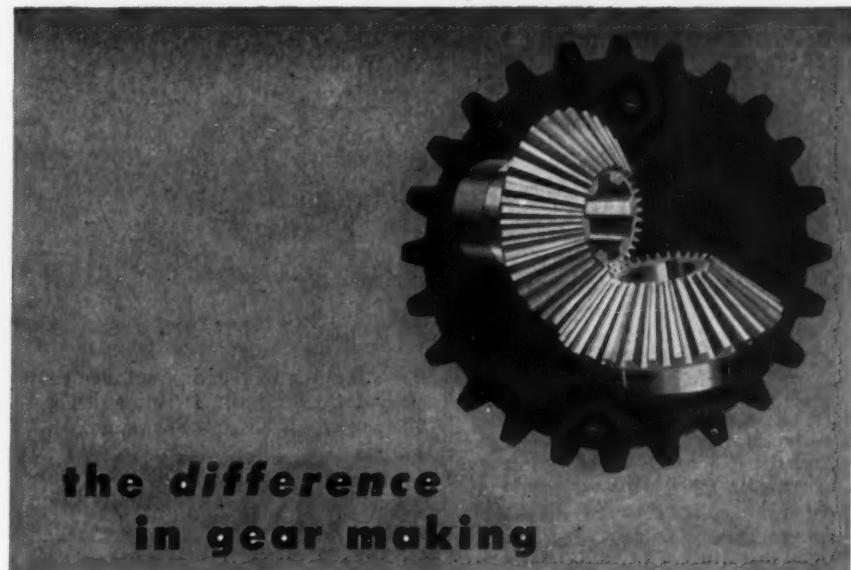
THE GAHR MACHINE CO.

19195 ST. CLAIR AVE.

CLEVELAND 19, OHIO



For more data circle 424 on Reader Service Card



the difference in gear making

It's craftsmanship in making gears that counts. The kind of craftsmanship that gives minute attention to every detail of manufacture. Adams gears are custom made to your most exacting specifications. Precision at Adams is more than a word, it's a fetish. When you specify Adams gears you actually get the ultimate in precision craftsmanship. It makes a big difference.

The Adams Company, 1942 Cypress St., Dubuque, Iowa

the ADAMS line . . . Spur gears • Bevel and Miter gears • Worms and worm gears • Sprockets • Internal gears (spur and helical) • Ratchets • Splined shafts • Lead and feed screws • Shaved Tooth gears (spur and helical) • Ground thread worms • Racks.

The ADAMS Company
Dubuque, Iowa, U. S. A.

ESTABLISHED 1883



FINE GEARS MADE TO YOUR SPECIFICATIONS

For more data circle 425 on Reader Service Card

For Arbor Spacers and Shims,
Feeler Stock or Shim Stock...

specify top-quality



ARBOR SPACERS

AND SHIMS

20 arbor sizes $\frac{3}{8}$ "
to 4" . . . 19 thick-
nesses .001" to .125"

Specify with or without keyways. Also available—hardened and ground spacing collars (with standard keyway) $\frac{3}{8}$ " to 3" long in all popular sizes. (For use in milling, slotting and gang-saw setups, shimming gears and bearings.)

FEELER STOCK

Made from tem-
pered stock, rolled
to close tolerances.



$\frac{3}{8}$ " x 25' coils
packaged in trans-
parent plastic boxes, except above .020".
Strips $\frac{3}{8}$ " x 12", in cellophane. 27 thick-
nesses. All thicknesses from .001" to .032".
(For use in precision fitting, checking clear-
ances, inspection and production work.)



SHIM STOCK

Selected from mate-
rial rolled to precision
limits, free from burrs,
and protected by oil
coating. Coils packed in
carton for easy dispensing
and protection. 15 thicknesses .001" to .032".
Sheets 6" x 12"; coils 6" x 120". Available also
in assortment package of 12 thicknesses
.001" to .015".

For details and prices,
write for descriptive literature.

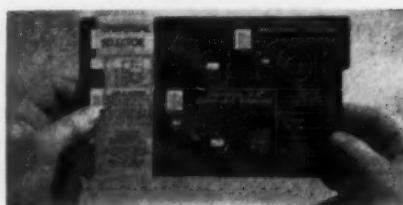


Detroit Stamping Co.

349 MIDLAND AVE. • DETROIT 3, MICH.

For more data circle 426 on Reader Service Card

new shop equipment . . .



Universal Slide Chart for jig designers

the selectors by writing on his company letterhead to Universal Engineering Co., Dept. D, Frankenmuth 9, Michigan.

For more data circle 115 on Reader Service Card

★ ★ ★

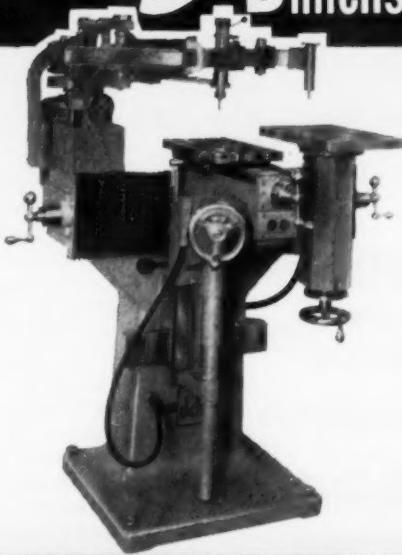
**IMPROVED LOCKING SPLINE
ARBOR HAS SPEEDY ACTION**

An improved locking spline arbor which has simple, positive construction and speedy action has been announced by Master Spline Tool & Gage Co., 19760 W. Eight Mile Rd., Detroit 19, Mich. Turning an eccentric rod forces the cam action to rotate the locking



Master Spline Improved Locking Spline Arbor

3-Dimensional panto-miller



For accurate pantograph milling on all 3-dimensional work, the "Panto-Miller" 3A is a sturdy production machine. Accurately reproduces copy on flat or curved surfaces, in reduced or magnified size.

NEW:

Capacity for workpiece height.
Sensitivity of linkage.
Range of pantograph ratios.
Accuracy of reproduction.
Finger-Tip Control of spindle speeds.
Ease of operation.

The new Panto-Miller 3A is an economical answer to many standard and special production problems. Write for Bulletin PM3, which gives details and specifications.

2-Dimensional panto-miller



Versatile and dependable for continuous service, the J & B "Panto-Miller" 2A:

Engraves
Profiles
Die Cuts
Mills

Investigate its advantages for your own applications. Send for Bulletin PM2

3-WAY Indexing Trunnion



Simple, Rapid, Positive positioning of workpiece or jig for all angle Drilling, Tapping, or Counter-boring. Available with Chuck, Faceplate, or Right-Angle Adapter Plate. Complete with Station Selector. For details, ask for Bulletin IT3.



EST. 1870

JOHNSON & BASSETT, INC.

PRODUCTION TOOL DIVISION
WORCESTER, MASSACHUSETTS

For more data circle 427 on Reader Service Card

April, 1956

modern machine shop 275

new shop equipment . . .

ring section, clamping the workpiece on each spline tooth. According to the manufacturer, this clamping action centers the workpiece concentric to the pitch diameter of the spline. When the cam rod is returned to its original position, the cam returns the locking ring back into alignment with the two fixed splines, thus releasing the work-

piece. The arbor is designed for holding the worm gear and for turning and hobbing operations.

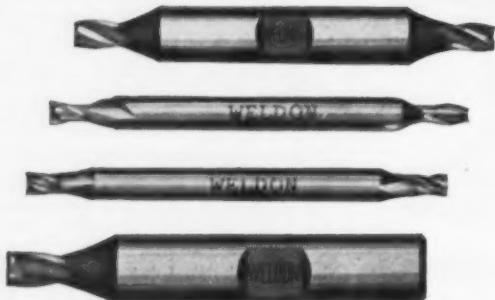
For more data circle 116 on Reader Service Card

★ ★ *

HIGH SPEED STEEL HOLE SAWS

The addition of a complete line of "Milford" High Speed Steel Hole Saws to its line has been announced by The Henry G. Thompson & Son Co., New Haven, Conn. Used in portable air and electric drills, drill presses, lathe tailstocks and so on, the hole saws are said to cut clean, round holes in virtually any machinable metal or other material. Welded edge blade construction is used, and is claimed to provide unusually hard, sharp, fast-cutting, long

YESTERDAY'S PIONEER . . . TODAY'S LEADER



WELDON

Stub Length Double-End End Mills

Stock Items

This line of small size end mills, in both double-end and single-end, with flutes shorter than regular, provides the following advantages:

**GREATER STRENGTH • LONGER TOOL LIFE
FAR LESS BREAKAGE • FASTER FEEDS**

Furnished in 2- and 4-flute styles

*Weldon distributors throughout U. S. A. and Canada carry
complete stocks to serve you*

THE WELDON TOOL COMPANY



3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO

For more data circle 428 on Reader Service Card



**"Milford" High Speed
Steel Hole Saw**

grinding and fitting

DIFFICULT CONTOURS

is EASY, with
BOYAR-SCHULTZ
Profile Grinders



BOYAR-SCHULTZ Profile Grinders have long been basic tools in Tool & Die Shops where daily operations require grinding and fitting odd shapes and irregular contours.

Work of this kind CAN be performed without a Boyar-Schultz Profile Grinder—but only at the cost of long hours of tedious hand work.

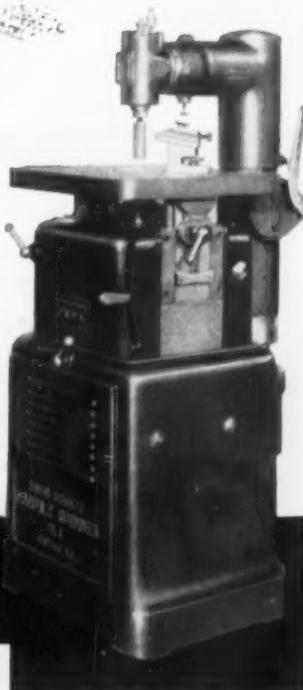
Spindle speeds of 10,000 and 20,000 R. P. M. afford rapid stock removal even with wheels of small diameter. WHEEL CAPACITIES: No. 1 Bench Model, $\frac{1}{8}$ " to 1" (20,000 R.P.M.), No. 2 Model with Single or Dual Spindle, $\frac{1}{4}$ " to 3" (10,000 R. P. M.). Write for complete description.



BOYAR-SCHULTZ
CORPORATION

2020 South 25th Avenue, Dept. AK,
BROADVIEW, ILLINOIS

For more data circle 429 on Reader Service Card



new shop equipment . . .

wearing teeth combined with a tough, resilient back. The result is a shatter-proof blade that takes the roughest use in stride. All of the hole saws are furnished with 6 teeth per inch and have a cutting depth of 1½ inches.

Also available is a complete selection of hole saw arbors, including the "follow thru" type. All come complete with high speed steel pilot drills, and those

for the larger diameter saws are equipped with drive pins for added torque transmission.

For more data circle 117 on Reader Service Card

★ ★ ★

AUTOMATIC-DRAIN FILTER AVAILABLE IN ¾ AND 1 INCH PIPE SIZES

C. A. Norgren Co., Englewood, Colo., has announced that new and larger sizes have been added to the line of its air line filters with automatic - draining facilities to meet the demand of plants with ¾ and 1 inch compressed air lines. The Models 11,200-6 and 11,200-8 are completely automatic. They are designed to create a strong centrifugal force that removes a high percentage of moisture from the air stream. Both models are available with a choice

Another NEWCOMER development!

It's New!



NS-3

CARBIDE



A premium steel-cutting carbide at regular prices

For universal use in

... Milling ▶ . . .



... General purpose machining ▶ . . .

VERY HIGH EDGE STRENGTH

Newcomer's new NS-3 grade of carbide . . . the grade industry has been talking about is now available for general distribution . . . Newcomer's fine reputation for "High Quality" carbides is solidly reflected in this new grade. On numerous steel cutting and milling applications including forgings, castings,

weldments, plate and highly abrasive steels, Newcomer NS-3 Carbide has shown exceptional resistance to edge wear, shock and chipping. Because of its versatility and wide range of general purpose uses, grade NS-3 makes proper grade selection easy.

Grade NS-3 is one of a series pioneered by Newcomer Products, Inc. for economical steel-cutting use. For complete performance data on this and all other steel and cast-iron cutting Newcomer carbide grades . . .

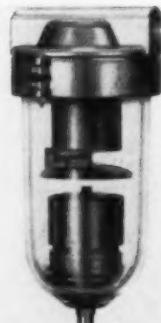
*Call your
NEWCOMER
representative* ▶

NEWCOMER PRODUCTS, Inc.

LATROBE, PA.

General Sales Office 512 Franklin Ave., Pittsburgh 21, Pa.
Sales Offices Located in Principal Cities

For more data circle 430 on Reader Service Card



**Norgren Automatic-
Drain Filter Unit**

GRIND WARPED PIECES *Without* SHIMMING



No Guesswork!

Increased

Production!

Save Time With

NEUTROLATOR

**Holding Power
REGULATOR**

and

CHUCK CONTROL

Neutrolator Electro Magnetic Chuck Control provides regulation of holding power which permits grinding without shimming, to closer parallelism than ever before possible.

In production grinding where holding power must be the same with each work piece, Neutrolator reproduces the same tension on successive pieces without readjustment. Where various tensions are required, a simple dial or pushbutton control provides regulation of holding power. Neutrolator affords complete control of electro magnetic chuck at all times . . . protects chuck from harmful voltage surges . . . demagnetizes both chuck and work piece . . . facilitates easy removal of work, thus eliminates marred surfaces.

Write for Descriptive Circular

Telephone: BELmont 5-4010

ELECTRO-MATIC PRODUCTS CO.

2235 NORTH KNOX AVENUE • CHICAGO 39, ILL.

For more data circle 431 on Reader Service Card



TO BE SURE OF
QUALITY

Remember
the Name

HOGGSON STEEL STAMPS



Letters and figures, deep-cut in hardened, special-formula steel, assure clean impressions and long service. Wide range of letter sizes. At your Mill Supply or write for circulars.

HOGGSON & PETTIS MFG. CO.

New Haven 7, Connecticut

For more data circle 432 on Reader Service Card

280 modern machine shop

new shop equipment . . .

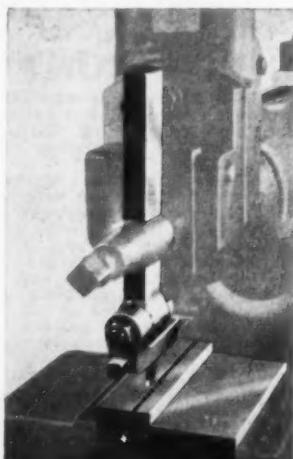
of three types of filter elements for the removal of solids—the standard 200-mesh wire screen (74 micron) and two optional 64 and 25-micron sintered bronze elements. A float-actuated drain mechanism discharges collected moisture automatically under constant or fluctuating air pressure and with or without air flowing. Special protection is provided to prevent entry of solids into the drain mechanism, avoiding clogging and reducing wear. The unusually large water capacity of approximately 1½ pints (which controls draining frequency) keeps wear on the drain mechanism at a minimum.

For more data circle 118 on Reader Service Card

★ ★ ★

PLANER AND SHAPER TOOL FEATURES SWIVEL HEAD

External planing and shaping, as well as internal grooving and slotting, are claimed to be possible with the Type



R.B. Type FH Planer and Shaper Tool

April, 1956

Opportunity...

TO WORK WHERE IT'S FUN TO LIVE

Can You Qualify?

- Electronics Technician or Engineer
- Design, Development and Research Engineer (Aircraft—Mechanical—Electrical)
- Physicist
- Draftsman
- Precision Production Machinist
- Precision Machine Operator
- Experimental Machinist
- Aircraft Sheet Metal Worker

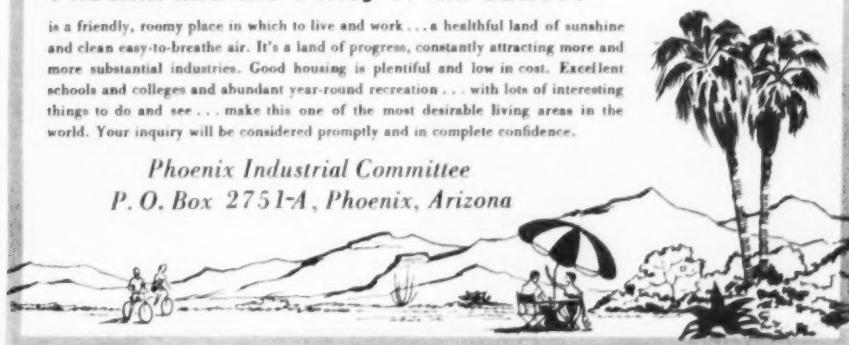
Here is what you should do:

- 1 Analyze your own qualifications carefully.
- 2 Send a summary of your qualifications and experience. State when you are available.
- 3 Do not come to Phoenix without first writing. Job opportunities are mainly restricted to specialists listed here. If your summary qualifies you for consideration you will be contacted by mail, phone or in person for further interview.

Phoenix and the Valley of the Sun . . .

is a friendly, roomy place in which to live and work . . . a healthful land of sunshine and clean easy-to-breathe air. It's a land of progress, constantly attracting more and more substantial industries. Good housing is plentiful and low in cost. Excellent schools and colleges and abundant year-round recreation . . . with lots of interesting things to do and see . . . make this one of the most desirable living areas in the world. Your inquiry will be considered promptly and in complete confidence.

*Phoenix Industrial Committee
P. O. Box 2751-A, Phoenix, Arizona*



For more data circle 433 on Reader Service Card

new shop equipment . . .

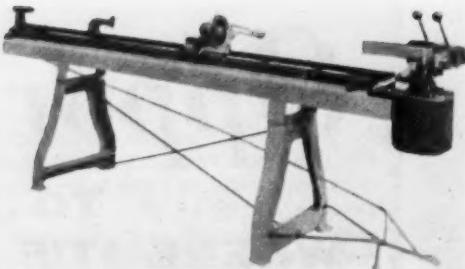
FH planer and shaper tool now being marketed by R. B. Tool Co., Inc., 785 N. Broadway, White Plains, N. Y. According to the manufacturer, the fact that the holder can be exchanged for extension bars for internal cutting work makes these operations possible. The holder also features a swivel head with adjustable spring action.

For more data circle 119 on Reader Service Card

★ ★ *

TUBE BENDER IS DESIGNED FOR EXTENDED RUNS

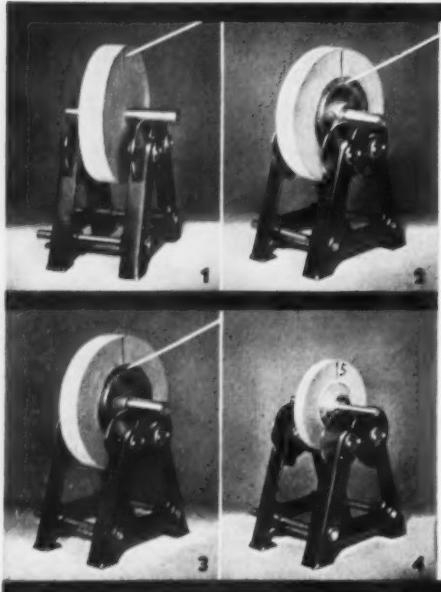
Leonard Precision Products Co., 9200 Bolsa Ave., Santa Ana, Calif., has announced the Leonard-Douglas "Bendmaster" Tube Bending Machine which is designed primarily for extended runs



Leonard-Douglas "Bendmaster" Tube Bender

where more than one bend per tube is required. A self-indexing system presets the machine for an entire sequence of bends. The tubing remains in the machine throughout the entire bending process.

Automatic stops control tube rotation, angle, degree and spacing of bends, providing absolute uniformity of finished pieces. All annealed ferrous and non-ferrous tubing from $\frac{1}{4}$ to



QUICK, EASY WAY TO BRING GRINDING, BUFFING, AND POLISHING WHEELS INTO BALANCE . . .

(1) Balance on Anderson super-sensitive Balancing Way and mark light side. (2) Line up mark with both zeros on Anderson Speedi-Balancer. (3) Turn both discs till wheel balances. (4) Record setting. Wheel is now prebalanced for instant use when needed: just use Speedi-Balancer, set to number marked, at outside collar. Save time. Eliminate weights. Reduce vibration. Increase motor bearing life. Improve motor performance. For information on sizes, types, and prices of Anderson Balancing Ways and Speedi-Balancers, write for Bulletin 4-22.

**ANDERSON BROS. MFG. CO.
ROCKFORD, ILLINOIS**

For more data circle 434 on Reader Service Card

YOUR VICTOR DISTRIBUTOR

can meet all your
metal cutting
needs

Whatever your particular
cutting operations, there are
Victor Hand and Power
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Band Saws and Hacksaw Frames
to meet your specific requirements.

Every Victor distributor can give you
prompt delivery of any metal cutting saw
you want. His men are backed up by Victor
factory experts who can show you the way
to new speed and economy on production
metal sawing operations.

Remember, no blade on the market will
cut faster or last longer than the right
Victor Blade—at the price you want!

And for top performance at a low price,
use Victor "Moly"® High Speed Steel
blades. Victor developed this high speed,
heavily-alloyed steel blade of molybdenum.
Remember, "Moly" High Speed blades
outlast standard steel blades 10 to 1, cut as
well as the best high speed steel blades
made, but are substantially lower in cost.

Free! Ask your Industrial Distributor for a
supply of our NEW Metal Cutting Booklets
and Wall Charts.

Sold Only Through Recognized Distributors

VICTOR

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VICTOR SAW WORKS, INC., MIDDLETOWN, N.Y., U.S.A.

MAKERS OF HAND AND POWER HACKSAW BLADES, FRAMES, AND METAL AND WOOD CUTTING BAND SAW BLADES.
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RECLINABLE POWER PRESSES



Ideal for general stamping work . . . 4 to 100 tons capacity. Can recline to 40° with perfect safety.

Our catalog contains a wide variety of press types and sizes. Write for it today.

*52nd year serving worldwide industry with Patent Percussion, Open Back, Double Crank, Punch, Horn, Toggle and Straight Side Presses, Dial and Roll Feeds.

ZEH & HAHNEMANN CO.
190 VANDERPOOL ST. NEWARK 5, N. J.

For more data circle 436 on Reader Service Card

BARKER Bench Type MILL
for Production Milling
of Small Parts by
Unskilled Help



\$295.00

As Shown



Screw Feeds
Optional

at Extra
Cost.

Write for
Details

500 GREEN RD., CLEVELAND 21, OHIO

For more data circle 437 on Reader Service Card

new shop equipment . . .

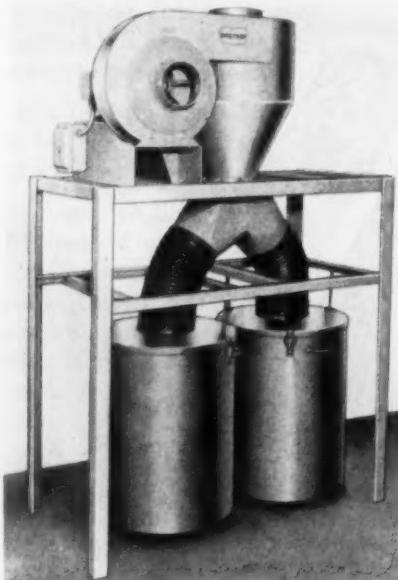
1-inch outside diameter can be accommodated by the manually-operated, floor model machine.

For more data circle 120 on Reader Service Card

★ ★ ★

DUST COLLECTOR FOR OUTSIDE EXPULSION OF CLEANED AIR

Designated as the 11NW50, a new model "Dustkop" Dust Collector, to be used expressly where the outside expulsion of the cleaned air is necessary or demanded, has been announced by Aget Mfg. Co., 1398 E. Church St., Adrian, Mich. The new addition is specifically designed for outside air exhaust, where application of recirculating air collectors is not practicable or is prohibited by local regulation.



"Dustkop" Model 11NW50 Dust Collector

2

ECONOMY LIFTERS

EVERY TOOL AND DIE ROOM SHOULD
HAVE FOR FAST, SAFE, HANDLING OF DIES

SHOPLIFTER

Use the SHOPLIFTER to avoid risk of painful accidents and to protect costly dies. Transport dies from storage area to press. To move dies in and out of press. Use it as an adjustable height bench for working on dies.

Platform lift 4'6", high enough for all press beds, yet overall height will clear any standard doorway.

Width 24". Moves easily between machines—in confined areas.

Spur gear hoist unit—most efficient hoist mechanism—lifts capacity load with only 20# crank pressure.

Friction disc clutch holds load securely—automatically.

Big safety factor for occasional overloading when necessary.

Three capacities to choose from

Type D (illustrated) 500 lbs. capacity.....	\$197.00
Type DX—1000 lbs. capacity.....	365.00
Type DX—2000 lbs. capacity.....	430.00

f.o.b. Chicago

ELEVATING TABLE

A husky Elevating Die Table, with big overload safety factor. Use as work bench at each machine.

Dimension 24"x36". Use it for small, medium and large dies. Capacity 2,000 lbs.



GREATER LIFTING RANGE

24" minimum to 42" maximum height. Wheels under base-frame—you can get up tight against press or rack.

Four crank studs—two at each end of table for high and low speed adjustment.

Roller bearings in wheels and casters for easy moving.

Floor lock holds table securely when moving DIES on and off.

Price \$215.00 F.O.B. Chicago.

Available from your local supplier

ECONOMY ENGINEERING CO., 4507 W. Lake St., Chicago 24, Illinois

Eastern sales office, 342 Madison Ave., New York 17, N.Y.

For more data circle 438 on Reader Service Card

new shop equipment . . .

The 11NW50 is also said to be adaptable to be used at installations where toxic fumes, obnoxious odors or smoke, as well as dust, accompany the operation for which the collector is used. The collector does not remove the fume or odor from the air but merely ex-

hausts it out of doors through a pipe which is connected to the outlet collar at the top of the "Cyclone Separator." The Model 11NW50 has an increased capacity up to 64 gallons and should be used where dust, shavings, chips or other collected material runs to greater volumes.

The dust collector is ruggedly built with framework of welded angle iron and dust drums of heavily reinforced sheet metal. Unloading maintenance is simplified by means of a wire reinforced neoprene flexible hose which connects to the rubber castered storage cans individually, and to the collector by a diverting "Y" to divert the flow of dust to one can while the other is removed for dumping.

For more data circle 121 on Reader Service Card



ETCHING STAMPS MADE FROM ACID-RESISTING MOLDED PLASTIC

The development of four styles of etching stamps, made from acid-resistant molded plastic, has been announced by Jas. H. Matthews & Co., 3944 Forbes St., Pittsburgh 13, Pa. The availability of these stamps should be of interest in the automotive and aircraft and allied industries, as well as the general metalworking industries, where they can be used for identification and inspection marking. The four styles of stamps are

INSPECTION PROBLEMS?
This booklet is for you!

To American Cystoscope Makers, Inc.
1261 LAFAYETTE AVENUE NEW YORK 39, N.Y.
Gentlemen: Please send me without obligation a copy of your booklet on Borescopes.

Name _____
Firm _____
Address _____
City _____ State _____

For more data circle 439 on Reader Service Card

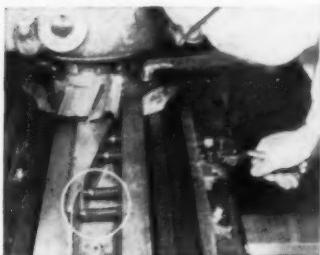
SPELLMACO "SPOTTERS"

A matched set of transfer punches
for toolmakers, machinists & tool cribs
Used for transferring location of threaded, drilled
and reamed holes, slugs, blanks, etc.
Precision made of finest tool steel—Carefully heat treated and tempered for long life—.0025 undersize to facilitate use—Black oxide finish.
SET #3-17; 28 punches with indexed stand—sizes 3/32" to 1/2",
by 1/64"—plus handy 17/64" size. Length 4 1/4". ONLY \$16.80.
Single sizes available

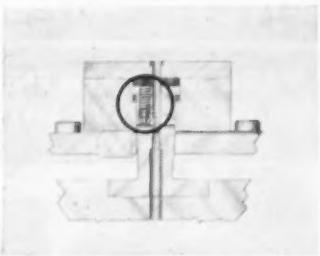
R. L. SPELLMAN CO. • URBANA, OHIO

For more data circle 440 on Reader Service Card

What can be done to lower YOUR tooling costs?



CLAMPING OFF-ANGLE PARTS in jigs and fixtures is a cinch with Vlier Swivel-Pad Clamps. Pad swivels on a ball, $7\frac{1}{2}$ " each side of center line. Can't bind or damage part surface. Socket set models can be inserted from either end.

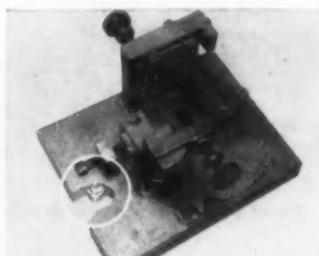


NEED ACCURATE, UNIFORM SPRING LOADS? Vlier Spring plungers really pay off when positioning parts in jigs and fixtures. Spring loads are accurately set at the factory; stay constant. Plunger telescopes completely.

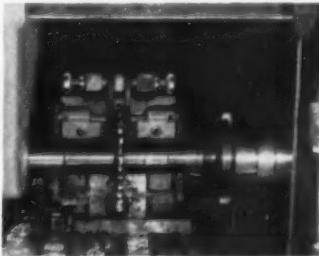


Thousands of companies are making drastic savings by using standard Vlier Tooling

Specialties instead of costly custom-made substitutes. The applications shown below are only the *obvious* uses for these simple, inexpensive tooling specialties.



PERFECT ALIGNMENT OF JIGS AND FIXTURES ON MILL TABLES is assured every time with Vlier Fixture Keys. Each key is precision machined to three slot dimensions, enabling the job to be run on any suitable mill in shop.



THE RIGHT AMOUNT OF CLAMPING PRESSURE AND NO MORE! There's no distortion of the part when Vlier Tongue Thumb Screws are used to clamp it in the jig or fixture. Once predetermined end pressure is reached, the head turns freely. Working parts are protected from foreign matter.



Where can your tool room save?

Chances are, you can think of dozens of uses for standard Vlier Tooling Specialties—applications where expensive, complicated, home-made devices are now being used. Why not write for your copy of the new 1956 Vlier catalog today?

Originators of small parts that make a big difference in tooling costs!



VLIER ENGINEERING INCORPORATED

8900 Santa Monica Blvd., Los Angeles 46, California

For more data circle 441 on Reader Service Card

new shop equipment . . .



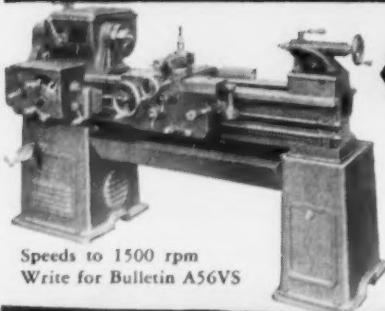
Matthews Plastic Acid-Etch Marking Stamps

as follows; peg style, for most general use, in which the plastic stamp is mounted on a rectangular or round

wooden peg; dowel type, similar to the peg style with the addition of a special cap and self-contained ink pad, which fits on the stamping end; key-chain dowel style, also with a cap and self-contained ink pad, but for affixing to a key-chain; and the pocket-clip style, all-metal with a cap and ink pad, and with a pocket-clip to enable the user to carry it on the person like a fountain pen.

Acid-etch inspection and identification marking finds great use where the part to be marked is of a delicate nature or is made from a delicate material or where the part is odd-shaped, making it difficult to mark with conventional methods. Nearly all metallic products can be acid-etch marked, and all marks are tamper-proof, as the mark can be removed only if the surface is removed. Unlike ordinary rubber stamp ink pads, the pads used to transfer most etching inks to the stamps are made of special porous material. Three varieties of

announcing . . . **2 NEW lathes!**



Speeds to 1500 rpm
Write for Bulletin A56VS

**16" VARIABLE SPEED ENGINE
AND TOOL ROOM LATHE
Model VS**

16" GEARED HEAD ENGINE LATHE Model GH

Two extraordinarily efficient lathes which enable you to
TURN MORE AT LOWEST COSTS



Spindle
speeds to
600 rpm
Write for Bulletin
A56GH

**THE CARROLL-JAMIESON MACHINE TOOL CO.
BATAVIA, OHIO**

For more data circle 442 on Reader Service Card



MILLING MACHINE ARBORS, ADAPTERS, ARBOR SPACERS AND BEARINGS

Hardened and ground to high standards of accuracy and quality.

These products are built by long established, reputable West German manufacturers, and tested for performance to American standards. Immediate delivery from New York City stock at low competitive prices.

Also available:

- Multi purpose vises
- Tapping attachments
- Lathe mandrels
- "Wille-Grip" keyless drill chucks
- Large variety of machine tools



QUICK CHANGE CHUCKS & COLLETS

All parts hardened and ground. Simplicity of construction insures trouble-free operation.



Our headquarters in New York City

Write for complete details and prices to Dept. 303

M.B.I. EXPORT & IMPORT LTD.

A Division of Machinery Builders Inc.

475 Grand Concourse, Bronx 51, N. Y.

"Over 20 years experience in designing and building machinery"

CABLE ADDRESS: Machbuild New York

Phone: MOTt Haven 5-0900

For more data circle 443 on Reader Service Card

April, 1956

modern machine shop 289



new shop equipment . . .

etching inks are available, the selection of the proper one depending on the metal surface to be marked. Any lettering, design or combinations of special symbols can be used on the etching stamps. The flexibility of such a system is said to provide unlimited coding possibilities. Special type faces have been de-

signed to produce extra-deep characters, an important factor for legible marking results and long service life. For more data circle 122 on Reader Service Card



COMBINED DRILL AND COUNTERSINK

Whitman & Barnes, 40050 Plymouth Rd., Plymouth, Mich., has announced

production of a new type combined drill and countersink, featuring spiral flute construction. The new tool is designed to provide smooth, accurate holes and is said to increase production by providing free cutting chip formation and efficient chip removal. The combined drill and countersink is available in the plain type in sizes



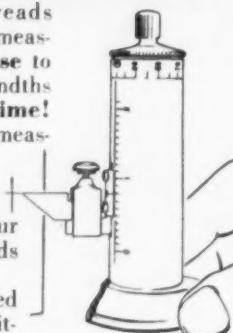
with GREIST MICRO-HEIGHT® GAGE

Precision-built Micro-Height reads faster than your micrometer! It measures height direct from zero at base to 3". Hundredths on barrel... thousandths on large head that cuts reading time! Attach your dial indicator for quick measuring between holes, surfaces!

CUT LAYOUT TIME!

Micro-Height also scribes like your vernier height gauge. Riser extends range to 9".

Precision-built, satin-chrome finished Micro-Height Gage quickly pays for itself! *Call your distributor or write.*



THE **GREIST** MANUFACTURING CO., 494 BLAKE ST., NEW HAVEN 15, CONN.

Precision Products since 1871.

For more data circle 444 on Reader Service Card



**W & B Combined
Drills & Countersinks**



At new low price \$124.50
with diamond.

SOMERSET TOOL CO.

NEW 1956 MODEL "SS"
RADIUS DRESSER
outperforms them all
Cut production time
without sacrificing ac-
curacy! Easy to set, easy
to see, eliminates nec-
essity of guard removal.
Somerset Radius Dresser turns "tricky" jobs
into routine operations.

Write for free
illustrated folder.

320 Virginia St.
Hillside, N.J.

For more data circle 445 on Reader Service Card



Model
UL 7120

The Leading Machine
Tool Manufacturers
use

RUTHMAN
GUSHER

COOLANT PUMPS

THE RUTHMAN MACHINE CO.

For more data circle 446 on Reader Service Card

MATTHEWS MARKING MACHINES

OTHER MACHINES

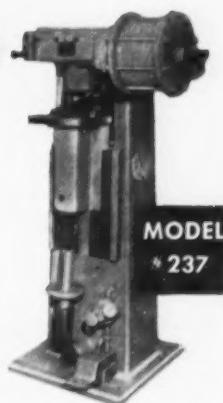
In addition to machines shown, Matthews has other General and Special Purpose Marking Machines, or they will engineer special machines for unusual marking applications. Write for recommendations, giving complete details of your marking requirements.

A pneumatically operated General Purpose Machine for marking up to 800 flat, round, or contoured parts per hour.



MODEL
*201

A Motorized
Rotary
Machine
for auto-
matically
marking up
to 7,000
cylindrical
or conical
parts per
hour.



MODEL
*237

JAS. H. MATTHEWS & CO.

3944 Forbes St. Pittsburgh 13, Pa.

For more data circle 448 on Reader Service Card

new shop equipment . . .

1 to 8, in high speed or carbon steel, and in the bell type, sizes 11 to 18, in high speed steel only. Both types have the new spiral flutes.

By careful selection of sizes and by some modification in drill body diameters, the number of sizes has been reduced from 13 to 8, thereby decreasing the number of tools necessary for most

centering requirements. Diameters of drill sizes range from 3/64 to 1/4 inch, with the length of the drill portion equal to that of the drill diameter.

For more data circle 123 on Reader Service Card

★ ★ ★

SANDING, DEBURRING AND GRINDING MACHINE

A streamlined and modernized version of its Bandsander sanding, deburring and grinding machine has been announced by Mead Specialties Co., Dept. B-42, 4114 N. Knox Ave., Chicago 41, Ill. The frame members are now steel stampings, instead of rough iron castings, and have a lustrous hammered satin finish in vista green. The original features of this unique machine have been retained and improved upon—

FREE BOOKLET
see how diamond
can cut your finishing
costs... how to use
diamond most
economically

ELGIN Diamond
...another famous for quality ELGIN Product

Precision graded in Elgin's own laboratories and scientifically compounded for maximum abrasive efficiency... recognized as the standard for diamond abrasive quality. Elgin Diamond saves hours of finishing time more precious than diamond itself. Write today for your copy of "Finish with diamond... ELGIN DIAMOND".

ABRASIVE DIVISION, DEPT. P

ELGIN NATIONAL WATCH COMPANY

ELGIN, ILLINOIS

For more data circle 449 on Reader Service Card



Mead Improved Industrial Bandsander

SPEED UP HAND FINISHING

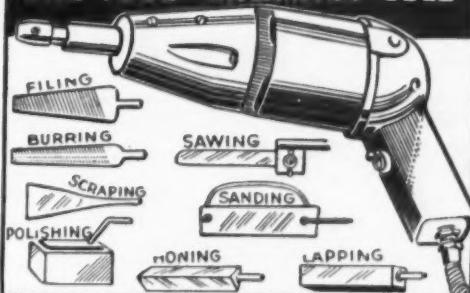
with

PORTABLE • ELECTRIC RECIPROCATING TOOLS

These handy tools will cut out many tedious hand filing and finishing operations — Increase Production — Produce Uniform Work.

Light in weight—Delivers $\frac{1}{8}$ " or $\frac{3}{16}$ " fixed stroke at 1000 strokes per minute—Operates on 110 volts AC or DC.

ONE TOOL - UNLIMITED USES



ACME TOOL COMPANY

73 WEST BROADWAY

NEW YORK 7, N. Y.

For more data circle 450 on Reader Service Card



repeats to .0001"
in 30
seconds

100%
guaranteed!



Offset Bo.ing Head

- Can be adjusted in fractions of $1/10,000"$ on the full diameter as easily as reading $1/16"$ on a steel rule. *Not a vernier or scroll adjustment.*
- Can be calibrated in increments of .00005 on radii or .0001 on diameter as easily as picking up .002 on a conventional micrometer dial.

Attach this ad to your letterhead and mail
for a free demonstration or literature!

PRECISION TOOL & MFG. CO. OF ILL.

1305 S. Laramie Ave., Cicero 50, Illinois

MM-4

For more data circle 451 on Reader Service Card

new shop equipment . . .

quick change of abrasive belts, tilting table top, automatic self-alignment of pulleys, automatic spring belt tension and the ability to pass the belt through cut-out openings to sand inner edges. The new model uses either 1 x 42 inch or 1 x 44 inch belts for both inside and outside grinding, making it unnece-

sary to stock both sizes. It is said to be equally good for roughing out coarse cuts or putting final finish on metal, plastic or wood.

For more data circle 124 on Reader Service Card



PLAIN RING GAGE SETS

Size Control Co., a division of American Gage & Machine Co., 2500 W. Washington Blvd., Chicago 12, Ill., has announced that Boremaster plain rings, used for setting dial bore gages, micrometers and so on, may now be obtained in sets to facilitate both inspection and storage. These low-cost rings are accurate to 0.0001 inch or less for roundness, straightness and taper (non-accumulative) with tolerance of plus or minus 0.0002 inch from basic size. Boremasters are made from standard A. G. D. blanks with the i.d. honed to 4 to 6 microinches r.m.s. Actual size is stamped to four decimal places on each ring. Standard cabinet set No. B-1 includes rings in steps of 1/64 inch, range 0.500 to 1.000 inch inclusive.

For more data circle 125 on Reader Service Card



PRECISION HEAD DRILLS UP TO 12 HOLES IN ONE STROKE

Identified as the "Top-flite," a precision drill head which is designed to

LESS DOWN TIME

means...

INCREASED
PRODUCTION
GREATER
EFFICIENCY

LOWER COSTS

SAVAGE TYPE "S" CUTTING
TOOLS AND DIES, made of high-carbon,
high-cobalt, special high-speed steel, are designed . . .

- FOR LONG LIFE
- TO SHRINK YOUR COSTS
- TO INCREASE YOUR
PRODUCTION

PATENTED SAVAGE TOOL-HOLDER
permits repeated sharpening with easy
tool-length adjustment.

"SAVAGE NIBBLING MACHINES
NIBBLE YOUR COSTS"

Quotation on Request

W. J. SAVAGE CO.

NIBBLING MACHINE PIONEERS
Knoxville Since 1885 Tennessee



For more data circle 453 on Reader Service Card

... for more than
1001 jobs



HJORTH LATHE & TOOL CO.
8 BEACON STREET WOBURN, MASS.

For more data circle 454 on Reader Service Card

PYRO Radiation Pyrometer



Determines spot temperatures of heat-treating furnaces, fire boxes, kilns and forgings accurately—instantly. No thermocouples, lead wires or accessories needed. Temperature is recorded on direct-reading dial at press of button. Two double ranges. Write for FREE Cat. #100.

The PYROMETER INSTRUMENT Co.
New Plant and Lab., Bergenfield 42, N. J.

For more data circle 455 on Reader Service Card

APPLY LAYOUT BLUE The Easy Way!



HANDY ELLISCO BRUSH TOP CANS MAKE IT EASIER FOR YOU TO APPLY AND STORE LAYOUT BLUE. BRUSH KEEPS MOIST IN CAN. CONTENTS WON'T DRY OUT 3 OZ. TO 1 QT. CAPACITIES. GET DETAILS AND BULLETIN NO. 60A.

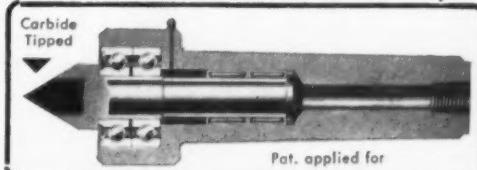
George D. Ellis & Sons, Inc.

4024 N. American St., Philadelphia 40, Pa.

For more data circle 456 on Reader Service Card

MORE OF EVERYTHING BUT WEAR . . . with Carbide Tipped CROSS* Live Centers

Prove to yourself carbide-tipped Cross Live Centers maintain precision output longer, on tough continuous run work—afford 2 to 3 times greater load capacity and outlive, as well as outperform, others. Test one! Available in Nos. 1, 2, 3, 4 and 5 Morse Taper, or straight shanks, other shanks to order. No. 2 M.T., \$39.00. Money back if center does not prove its worth in 24 day trial. Ask for folder. Write direct, if distributor cannot supply you.



HERBERT CROSS & SON, Bala-Cynwyd 1, Pa.
Est. 1910 *Makers of famous WEE Live Center.

For more data circle 457 on Reader Service Card

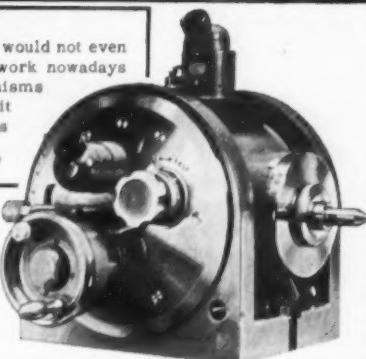
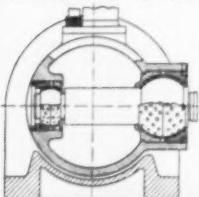
The New LEITZ Optical Dividing Head



A CUSTOMER SPEAKS:

"Without our Optical Dividing Head, we would not even attempt to make the critical indexing work nowadays necessary for things that fly, or mechanisms that must control angular motions to hit targets at a distance, to measure degrees, minutes and seconds, to eliminate angular velocity errors and vibrations in quick running mechanisms, etc."

The LEITZ Optical Dividing Head is the last word in indexing precision. Its construction is different from other optical and mechanical dividing heads on the market. A NEW DOUBLE SPHERICAL BALL BEARING, DOUBLE READING IN THE SAME EYEPIECE 180° APART, motor drive attachment and other features make the LEITZ an important aid required in any shop where precision is demanded.



← The 2 spherical ends of the spindle are carried in hardened steel cups with several hundred small precision balls held in place by ball cages in such a way that each ball creates its own path. There is no play, either radially or axially, no oil film, no wear and a very large load capacity.

Write for Descriptive Bulletin --- Code GIPAD

Geo. SCHERR OPTICAL TOOLS, Inc. 200-MM LAFAYETTE ST. • NEW YORK 12, N.Y.

For more data circle 458 on Reader Service Card

new shop equipment . . .

drill, bore, tap or ream up to 12 holes in one stroke in an area up to 18 inches in diameter has been announced by The Johnson Drill Head Co., 23rd Ave. and 20th St., Rockford, Ill. The head features interchangeable cluster plates jigged to customer requirements to eliminate trial and error setups, reduce set-up time and insure correct work with-

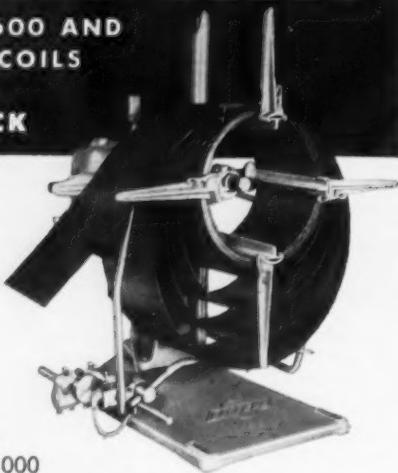
out rejects. Snap clips on the drive spindles permit quick interchangeability for different hole patterns. A steel reinforcing bar prevents the high-strength aluminum hood casting from cracking. The alloy steel gears are ball-bearing supported at both ends, and the driver is supported by roller bearings and is designed to compensate for drill press spindle runout. Gears are enclosed in a sealed gearbox, eliminating daily greasing, dirt and grit. The head can be operated horizontally, vertically or at any angle.

The lower spindles run in a grease-filled cluster plate, supported by thrust bearings on both ends, with needle bearings to take radial loads, making the head ideal for precision tapping operations. Both stub and lower spindles are hexed for quick hole pattern changes. There are no pins or set screws to adjust or wear out. Univer-

LITTELL REELS

**FOR 300, 600 AND
1,000 LB. COILS
DELIVERED
FROM STOCK**

No. 10
Littell Motor
Driven Automatic
Centering Reel
for up to 1000
pound coils.



Three sizes of
Littell Reels, for
300, 600 and 1000

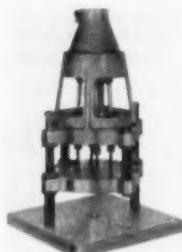
pound coils are now in stock for immediate delivery. Easy to load, they center the coil automatically, hold it in balanced position. You get easy, smooth unwinding, greater accuracy and higher speeds for both hand and automatic feeding. All three sizes available in single or double Plain Brake or Motor Driven Reels. Write for catalog.



ROLL FEEDS • COIL CRADLES
STRAIGHTENING MACHINES
REELS • AIR BLAST VALVES
District Offices: Detroit, Cleveland

4163 N. RAVENSWOOD AVE., CHICAGO 13, ILL.

For more data circle 459 on Reader Service Card



**Johnson "Top-flite"
Drilling Head**



PALMGREN

for MILLING MACHINES,
DRILL PRESSES,
GRINDERS, SHAPERS...

64 different models and
types of vises, rotary
tables, milling attachments,
and other machine tool accessories.

WRITE FOR
CATALOG #203.

MILLING MACHINE VISSES

No. 40B and 60B
4" and 6" Jaws
with or without
SWIVEL BASE



CHICAGO TOOL AND ENGINEERING CO., 8399 South Chicago Avenue, Chicago 17, Illinois

For more data circle 460 on Reader Service Card

Now Available in . . . "SPRAY ON" CANS
and in "BULK"

CROWN design layout ink

Order it the way you use it — In
handy 12-oz. Aerosol spray cans, or
by the pint, quart, gallon or barrel.
In bulk! Crown ink dries to an ex-
cellent scribing texture in a minute!
Ideal for pattern, "OK" or "reject"
marking.

Contact your distributor,
or write:



Just Press the
Trigger on the Can

CROWN INDUSTRIAL PRODUCTS CO.

809 Amsterdam St., Woodstock, Ill.

For more data circle 461 on Reader Service Card

People work better when they SEE BETTER



MAGNI-FOCUSER

SPEEDS PRODUCTION

With Third Dimensional (3-D) Vision
Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents. Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. \$10.50.

Send for descriptive folder

At Superior Tube Co.—Inspectors use Magni-Focuser to ensure flawless hypodermic needle tubing.

MAGNI-FOCUSER's

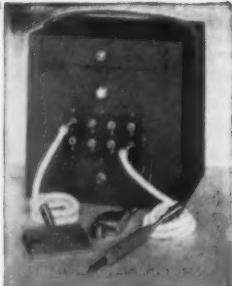
matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

EDROY PRODUCTS CO.

480 Lexington Ave.
Dept. P, New York 17, N. Y.

For more data circle 462 on Reader Service Card

**MARK
IRON,
STEEL
and
CARBIDES**



**THE
Etchograph
Mark**

WAY

Original Electric Etcher, Thousands in Daily Use
Mark hardened parts, tools, dies, gages
and fixtures of any ferrous metals including
the hardest alloys and carbides—
quickly—plainly. • Three sizes to meet
all requirements.

• Write for circulars and prices.

BREWSTER-SQUIRES CO.

P. O. Box 601

Englewood, N. J.

For more data circle 463 on Reader Service Card

**DORMAN
AUTOMATIC REVERSE
TAPPERS**

- Automatic Torque Control, One Minute to Adjust, Prevents Tap Breakage, Operator Need Not Be Skilled.
- WIDE RANGE TAP CAPACITY.

No. 1A FRICTION DRIVE TAPPER — capacity No. 2-56 to $\frac{3}{8}$ " in Steel — $\frac{1}{2}$ " in Aluminum.

No. 2B POSITIVE TAPPER — capacity $\frac{3}{4}$ " to $\frac{7}{8}$ " in Steel.

No. 3A POSITIVE TAPPER — capacity $\frac{1}{2}$ " to $1\frac{1}{4}$ " in Steel — $\frac{1}{2}$ " to $\frac{3}{4}$ " Pipe Taps.

No. 4A TAPPER — capacity $\frac{3}{4}$ " to 2" in Steel including Pipe Taps.

- PRODUCTION THREADERS with Round Split . . . Button . . . Acorn Dies.

Priced from \$50.00
Write for Bulletin IMMEDIATE DELIVERY

THRIFTMASTER PRODUCTS CORPORATION
Division of Thomson Industries, Inc.
1034 N. PLUM STREET, LANCASTER, PA.
STANDARD UNIVERSAL ADJUSTABLE AND SPECIAL FIXED CENTER DRILLHEADS

For more data circle 464 on Reader Service Card

new shop equipment . . .

sal joints are sealed in lubrication-retaining rubber covers. Light and heavy cluster plates are available for varying work requirements. The "Top-flite" Drill Head can be supplied in both fixed and universal types and can be provided with special spindles.

For more data circle 126 on Reader Service Card

★ ★ ★

**VACUUM SINTERED STEEL
CUTTING CARBIDES**

Designated as the Series 8-A and the Series 6-A, two new carbide grades specifically designed for machining tough steels, alloy steels and high tensile strength steels have been announced by Willey's Carbide Tool Co., 1340 W. Vernor Highway, Detroit 1, Mich. These two vacuum sintered carbides, Series 8-A for roughing cuts and



**Willey's Vacuum Sintered Steel Cutting
Carbides for machining tough steels**

REDUCE Set-up Time and the
need for expensive jigs & fixtures

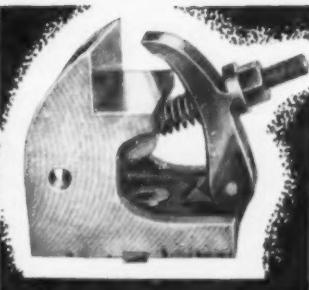
HART MILLING FIXTURES

"Masters of A Thousand Set-ups"

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illustrated
Folder

Value proved by years of use.

WALTER W. FIELD & SON, INC.
39 Hayward St., Cambridge 42, Mass.



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DYKEM
STEEL BLUE
Stops Losses

making Dies and
Templates

Popular package
8-oz. can fitted
with Bakelite cap
holding soft-hair
brush for applying right
at bench; metal surface
ready for layout in a few min-
utes. The dark blue background
makes the scribed lines show up in
sharp relief, prevents metal glare.
Increases efficiency and accuracy.

Write for sample on company letterhead
THE DYKEM COMPANY
2301F North 11th St. • St. Louis 6, Mo.

For more data circle 466 on Reader Service Card

Faries

**NEW R.F. IDEA
INCREASES
PRODUCTION!**

LOUVERED SHADE eliminates
shadows, reduces fatigue,
ventilates dust (increasing
light efficiency 30%). See
cigarette test!

GREATER ADJUSTABILITY than
any other fluorescent lamp
made. Extends from 14" to
37". One lamp does job of
two!

FRiction-free design means
no screws to tighten. "Stays put" in any position. Completely counter-balanced by gravity.
Both arm and shade rotate 360°. Entire lamp approved by Underwriters' Laboratories.

WRITE FOR FREE ILLUSTRATED CATALOG #M-4.

Faries LAMP DIVISION • ELWOOD, INDIANA

For more data circle 467 on Reader Service Card

new shop equipment . . .

Series 6-A for finishing cuts, are claimed to permit high feed and speed rates in steel cutting operations. According to the manufacturer, maximum edge strength coupled with unusual wear qualities and an excellent resistance to cratering offer the user outstanding tool performance. The Series 8-A and Series 6-A grades are avail-

able from stock in all standard blank sizes. Preformed blanks can be furnished to customer specifications.

For more data circle 127 on Reader Service Card

★ ★ ★

THREAD BROACHES OPERATE IN SHEAR CUTTING MANNER

Designated as "Unbreaka," thread broaches (taps) which operate in a shear cutting manner to force the chip that is removed ahead of the tool, thus completely eliminating tap breakage through chip interference, have been announced by Shearcut Tool Co., Dept. C, 7045 Darby Ave., Reseda, Calif. The left-hand flutes feed the coolant or cutting oil downward, assuring a

**MODEL
1220**



KALAMAZOO

METAL CUTTING BAND SAW

big, rugged, built for heavier production

MODEL 8C
Cuts 8" round, 16"
flat, 8" pipe.

MODEL 610
Cuts 6" round, 10"
flat.

KALAMATIC AUTO-MATIC BAR FEED ATTACHMENT for
Kalamazoo Metal Cutting Band Saws.

Cuts 12" round, 20" flat stock. Accurate to thousandths of an inch, minimum burr and kerf. Four cutting speeds, four blade-tension adjustments for better sawing, longer blade life. Safety-designed throughout—only cutting section of saw blade is exposed. Positive power from heavy duty 1 HP motor. Available with coolant equipment.
Ask your dealer for details and demonstration.

MACHINE TOOL DIVISION

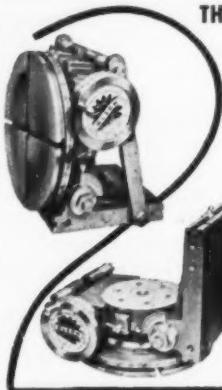
Kalamazoo TANK and SILO CO.

410 HARRISON ST., KALAMAZOO, MICHIGAN

For more data circle 468 on Reader Service Card



**Shearcut "Unbreaka"
Threading Broach**



**THE TWO IN ONE
COMBINATION
ROTARY TABLE
AND
ANGLE PLATE
PRECISION
ACCURACY**

WORM adjustable from 0 to 90 degrees.

VERNIER control to within

2 seconds of Arc.

Makers of Helical Gear Speed Reducers. Worm and Gear Speed Reducers. Standard and Special Gears. Wedge-Lock Turret for Lathes and Turret Lathes.

Open territory available to representatives

OLSON INDUSTRIAL PRODUCTS, INC.

40 W. WATER ST. • WAKEFIELD, MASS.

For more data circle 469 on Reader Service Card

Model No. 50

NUMBERALL

AUTOMATIC INDENTING NUMBERING HEAD



Automatic indenting numbering head for consecutive or repeat numbering. $\frac{1}{2}$ "

up to $\frac{3}{8}$ " high figures can be furnished in sharp face Gothic or shaded Roman figures. Can be used in foot or power presses. Numbers: radio, airplane, tool parts, name plates, and other objects in brass, steel, fiber, plastics. Heads are of sturdy construction and give uninterrupted marking service. Catalog MS-50 on request.

NUMBERALL STAMP & TOOL CO.

HUGUENOT PARK STATEH ISLAND 12, N.Y.

For more data circle 470 on Reader Service Card

How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.

The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.



Patents Pending

Write for
Literature

SLEEVES MADE IN FOLLOWING SIZES:
3-16, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 1"

STURDY BROACHING SERVICE, INC.

23516 TELEGRAPH ROAD

DETROIT 19, MICH.

For more data circle 471 on Reader Service Card

new shop equipment . . .

copious supply of cutting compound at the cutting point. This feature is said to dissipate heat and also wash out small particles of metal which tend to cause abrasion and shorten tap life. According to the manufacturer, this type of tap should prove to be practically un-

breakable, for it becomes progressively stronger from the front to the back of the threaded section, and only about one half of normal tapping torque is required to form the thread.

Designed to operate at drilling speeds or faster, the "Unbreaka" Thread Broaches do not bind or seize in the hole, have long life per grind and may be resharpened many times. The broaches are interchangeable with standard taps.

For more data circle 128 on Reader Service Card

The STEVENS Line SINCE 1925

Introducing NEW series



15" ROTARY TABLE—STD.

ROTARY TABLES, 5-7½-8-12-15-18-24" sizes both standard and dial indexing types

ADJUSTABLE TILTING TABLES, #0-1-2

COMPOUND TABLES, #1-2

ROTARY-COMPOUND TABLES, #1-1½-2

INDEX CENTERS—multiple spindle

SPECIAL MACHINES—designed and built

See your dealer or write for bulletins

The John B. Stevens Company

Main Street, Somerville, Conn., U. S. A.

For more data circle 472 on Reader Service Card

★ ★ ★

DOUBLE-SOLENOID FOUR-WAY VALVE FOR OIL SERVICE

Racine Hydraulics & Machinery, Inc., 2070 Albert St., Racine, Wis., has announced a double-solenoid four-way valve for oil service that is constructed ruggedly to withstand 2,000 p.s.i. pressure throughout and will allow full back pressure on the exhaust port. Honed sleeve construction is said to assure a smooth, continuous riding surface for the piston and a long, efficient life for the valve. A smooth throttled reversal is obtained through the round holes in the sleeve. These holes can be elongated to increase this throttling action when desirable. According to the manufacturer, there is minimum pressure drop through the valve because the area through the valve is equal to or greater



Patented

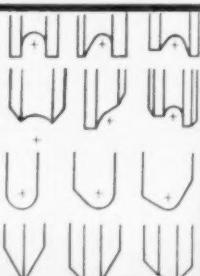
WHY WASTE TIME?

Dress Profiles like these in a few minutes without Templates or Crusher Rolls with the Jeon Automatic Angle Tangent to Radius Dresser. It's fully universal.

Write for Price and Folder.
Representatives Wanted.

JEON MANUFACTURING CO.

P. O. BOX 6750 WASHINGTON 20, D. C.



For more data circle 473 on Reader Service Card



VERTICAL

At last, a top quality industrial sander that provides all the most wanted features - yet sells for so little. **\$89.95**

complete with cord, plug, switch ready to use

Illustrated Literature on Request

A few desirable distributor territories still available.

WALLS SALES CORPORATION
333 Nassau Avenue Brooklyn 22, N. Y.

For more data circle 474 on Reader Service Card For more data circle 475 on Reader Service Card



**STEEL
PRESS
BRAKES**

43 Standard Sizes

Readily adapted for a wide variety of bending, forming drawing, notching, blanking, punching, embossing, etc.

DIES Complete Line of Induction Hardened Dies for All Makes and Sizes of PRESS BRAKES.



Powered by the press ram... independent of the die

2 SIZES Cuts steel up to $\frac{1}{16}$ " thick

3" WIDE \$69 6" WIDE \$95

Guaranteed - money back if not 100% satisfied



WRITE FOR FULL DETAILS TODAY!

Dealer Inquiries Invited

JACO DEVICES, INC.

98 High Street

HINCHAM, MASS.



4914

DREIS & KRUMP

MANUFACTURING COMPANY

7418 S. Loomis Boulevard, Chicago 36, Illinois

CHICAGO

STEEL BENDING BRAKES
BOX and PAN BRAKES
PRESS BRAKES

For more data circle 476 on Reader Service Card

new shop equipment . . .

than the area through connecting pipes. Non-rolling type, homogeneous oil seals insure against leakage and minimize static and dynamic friction.

The solenoid pilot principle is employed to permit the use of small, dependable, rugged solenoids. This fea-

Accurate Hole Transfer Made Easy With **NIELSEN TRANSFER SCREWS**

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 3/16" to 1/2" U.S.S. Inexpensive — Last for years.



Write for Circular
**NIELSEN TOOL &
DIE COMPANY**
P. O. Box 1067
Berkley, Mich.

For more data circle 477 on Reader Service Card

CUTTING STOCK DIAMETERS UP TO 40 INCHES?

USE

Skee-Anthony

(PATENTED)

CUTTING OFF TOOLS

for . . .

- ★ BORING MILLS
- ★ LATHES
- ★ PLANERS
- ★ SHAPERS



THE
LEADER
FOR 14 YEARS

Patented pivoting trunnion, safety-slip and support blade prevent blade breakage and injury to operator. Fast adjustment to lathe center.

Write for free descriptive folder A-1

-SKEE TOOL COMPANY
1406 N. FLORES ST.
SAN ANTONIO, TEXAS

• Few Industrial Areas Open for Representatives •

For more data circle 478 on Reader Service Card



Racine Double-Solenoid Four-Way Valve

ture is said to allow control of the spool movement at rates insuring non-shock operation. The valve operates with 50 p.s.i. pilot pressure. Versatility of sleeve-type construction allows innumerable porting modifications for simplification of circuits. The valve conforms to J.I.C. specifications.

For more data circle 129 on Reader Service Card

★ ★ ★

HIGH SPEED GROUND THREAD PILOTED TAPS

Threadwell Tap & Die Co., Greenfield, Mass., is now offering high speed ground thread piloted taps and piloted tap kits as standard stock items in its

AT LAST!

A Low-Priced Dial Type Indicator Has 2 contacts 1/32" threaded within 1/8". Double faced. Reads front and back. Two Crystals. Double faced dial indicator complete with plated holder including 1/32" and 1/8" contacts —

Black Penetrant \$8.95
No. 4 Superior Magnetic Base and Indicator Holder... \$8.95

Thousands of satisfied customers!

SUPERIOR INDICATOR CO.
P.O. Box 734, Rochester 3, N. Y.



Patented

For more data circle 479 on Reader Service Card

TROYKE

ROTARY TABLES

- Saves fixtures and time consuming setups.
- Saves time in circular positioning.



WORM WHEEL OPERATED
ROTARY TABLES

Five Sizes: 9", 12", 15", 18", 21"
For die sinking, jig boring, cam milling. Indispensable in wood and metal pattern shops.

WRITE FOR CATALOG No. 22.

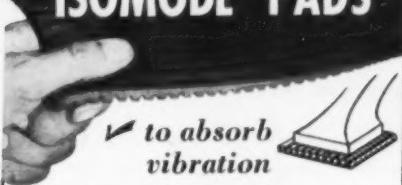


TROYKE MFG. CO.

CINCINNATI 9, OHIO

For more data circle 480 on Reader Service Card

Put machines on ISOMODE® PADS



- ✓ to absorb vibration
- ✓ reduce noise
- ✓ cut maintenance

Economical, effective mounting — 1 sq. ft. enough for 4 tons of machine weight. Neoprene — lasts for years, 5/16" thick, 18" square, ten to the standard package. Easily cut to shape and installed under most machines — big punch presses included. No cementing necessary. Write for Bulletin No. 415.

MB Manufacturing Company

A division of Textron American, Inc.
1067 State Street, New Haven 11, Conn.

For more data circle 481 on Reader Service Card

To Save You
Hours of
Detailing
Time...

A New Extended Range of O.D. Symbol Listings For ECONOMY Bushings

ECONOMY'S new "Dimensional Data Sheet No. 7-A" includes an *extended range* of Standard Drill Jig Bushings by symbol listings up to 5" O.D. by 5" in length.

This eliminates all need for detailing. You specify by symbol and hole size only.

Ask for "Dimensional Data Sheet
No. 7-A" TODAY!



ECONOMY TOOL & MACHINE CO. 1827 SOUTH 68TH STREET
MILWAUKEE 14, WISCONSIN

For more data circle 482 on Reader Service Card

new shop equipment . . .



Threadwell Ground Thread Piloted Tap

tap line. The high speed ground thread piloted taps are offered in five fractional sizes ranging from $\frac{1}{4}$ through $\frac{1}{2}$ inch in the H-3 tolerance and in both N.C. and N.F. pitches. They are also available in three machine screw sizes from No. 6 through No. 10 in the H-2 tolerance and in both N.C. and N.F. pitches.

The fractional size piloted tap set contains one each $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{16}$ and $\frac{1}{2}$ -inch N.C. or N.F. GH-3 piloted tap and one each standard high speed GH-3 bottoming hand tap of the corresponding size and pitch. The machine screw size piloted tap set contains one

each of Nos. 6, 8 and 10 N.C. or N.F. GH-2 piloted tap and one each standard high speed GH-2 bottoming machine screw tap of the corresponding size and pitch. All are packaged in protective plastic containers. The sets are said to offer the advantage of having the full range of sizes on hand, along with a matching bottoming tap for such applications as blind hole tapping where the piloted tap is used as a starting tap and the bottoming tap is used to complete the job.

For more data circle 130 on Reader Service Card

★ ★ ★

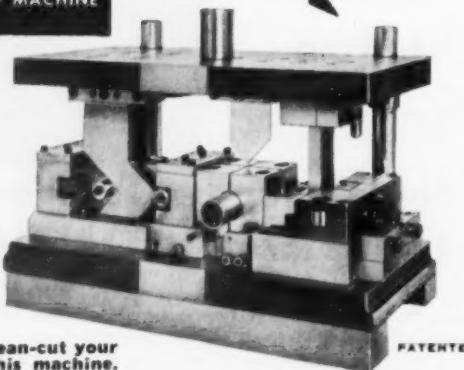
WORK HOLDERS UTILIZE BUILT-IN LOCKING MECHANISM

"Circle-Grip," a unique built-in locking mechanism of "Grip-Master" Vises and Fixture Locks has been incorporated into two new work holders announced by Heinrich Tools, Inc., Dept.

• Cuts Tubing to Accurate Lengths in - SPLIT SECOND TIME!

- LENGTHS of $\frac{1}{2}$ inch or more are accurately cut to $\pm .010$ " with each stroke of press—actually less than $\frac{1}{2}$ of a second or faster than any other known method.
- In addition to being rapid and precise, the Vogel Cut-Off also cuts clean with a minimum of burr and distortion. Many thousands of cuts can be made before shear blades require sharpening.
- Unit No. 12 accommodates tubing up to $\frac{1}{2}$ " O.D. with $3/32$ " wall; the No. 2 takes tubing up to 2" O.D. with $\frac{1}{8}$ " wall.
- Ask for sample showing how clean-cut your tubing can be sheared with this machine.

**VOGEL TUBE
CUT-OFF MACHINE**



VOGEL

TOOL AND DIE CORPORATION

1823 NORTH 32nd AVENUE, MELROSE PARK, ILLINOIS

For more data circle 483 on Reader Service Card

Hammond
OF KALAMAZOO
2 IN 1
NO-DUST
GRINDER



SAVE OVER 50% FLOOR SPACE
THE HAMMOND WAY



- DUST-LADEN AIR IS A MENACE!
- Protect your employees' health.
 - Protect nearby machine tools from dust and grit.
 - Save floor space — requires only 6½ square feet.
 - For 10", 12", and 14" wheels.
 - Write for Catalog.

Hammond Machinery Builders Inc.
1618 DOUGLAS AVENUE KALAMAZOO, MICHIGAN

For more data circle 484 on Reader Service Card

CANT RIVETERS



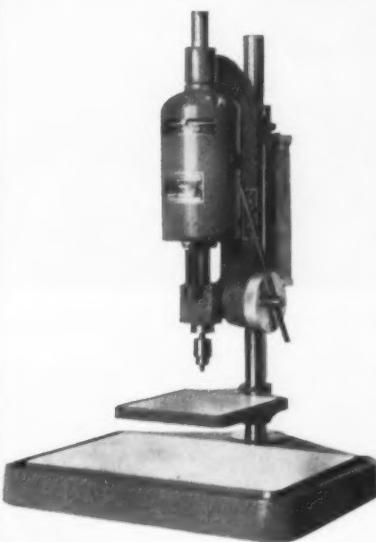
- Pioneers in the riveting field. Head rivets from smallest to 3/4" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. Write for literature — and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
96 Silliman Ave. . Bridgeport 5, Conn

For more data circle 485 on Reader Service Card

April, 1956

HIGH SPEED
PRODUCTION DRILLING
OF VERY SMALL HOLES . . .



*is accomplished
more efficiently,
more economically
with a drilling machine
specifically designed for
this type of work.*

Electro-Mechano 8" drill presses include all those features which years of experience have proven to be best for profitable operation in the drilling range of .004 to 5/32".

**Write NOW for Descriptive
Bulletin!**

The ELECTRO-MECHANO Co.

265 E. Erie St., Milwaukee 2, Wisconsin

For more data circle 486 on Reader Service Card

modern machine shop 307

new shop equipment . . .



Heinrich No. 12WH Band Saw Vise in use

116-C, Racine, Wisc. According to the manufacturer, the "Circle-Grip" locking mechanism provides instant setting

and positive locking. The new work holders are the No. 12WH Band Saw Vise and the No. 13WH Safety Drill Press Vise. The No. 12WH Band Saw Vise can be set instantly by sliding a movable jaw into position. It has a capacity of 12½ inches. The workpiece is locked securely by a light press of the locking lever. Hands are clear of the saw for safe operation. Hardened and ground bar and locking mechanism insure long life, and a soft cold-rolled guide bar prevents damage to saw blades by contact with the hardened bar. Removable shoulder screws are provided for the purpose of automatic chain feed operation.

The No. 13WH Safety Drill Press Vise has a capacity of 6 inches. It also features the "Circle-Grip" locking mechanism with instant setting and secure locking advantages. The safety drill press vise with table mounting attachments fits any style drill press and

FREE—New Bulletin T-1 shows, describes
VAILL tube end forming machine
VERSATILITY for . . .

Beading • Flaring • Flanging
Sinking • Expanding • Grooving
Threading • Reducing
• Double Lap Flaring
• Double Lap Flanging
on Tubing up to 6" Diam.

VAILL
TUBE END-FORMING MACHINES
shape and form tube ends
fast... accurate... at less cost

THE VAILL ENGINEERING CO., 133 E. MAIN STREET, WATERBURY 20, CONN.

For more data circle 487 on Reader Service Card

308 modern machine shop

April, 1956

eliminates clamps, straps and adapters. Anchored firmly in position, the vise frees the operator's hands of all moving parts and eliminates danger of the unit breaking loose from table. The vise swings off the table when not in use. A corner mounting attachment is also available. The safety drill press vise instantly sets to any opening within its capacity and is said to be ideal for production setups.

For more data circle 131 on Reader Service Card

★ ★ *

CONTROL PANEL PROVIDES AUTOMATIC METALLIZING PRODUCTION LINE

Designated as the Type CP, a control panel which is designed to make it possible to have a completely automatic metallizing production line has been announced by Metallizing Engineering Co., 1111 Prospect Ave., Westbury, Long Island, N. Y. According to the



Metco Type CP Metallizing Control Panel

Almost 100 sizes and combinations available . . .

American ALL PURPOSE PUMPS

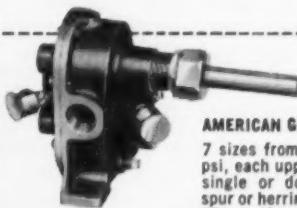
Made of tough bearing bronze and precision machined
... Yet they cost you less!

Neoprene Impeller • Gear and Centrifugal types



AMERICAN Neoprene Rubber Impeller Pumps

6 sizes from $\frac{1}{4}$ " to $1\frac{1}{4}$ " ips. Easily replaceable impeller is keyed to shaft. Passes small particles without jamming. Operates in both directions at high or low speeds.



AMERICAN Gear Pumps

7 sizes from $\frac{1}{6}$ " to $\frac{1}{4}$ psi, each upper or lower, single or double shaft, spur or herringbone gear. 20' suction lift without priming. Develops pressure of 100 lbs.

Write today for detailed information on the comprehensive line of AMERICAN pumps . . . Ask for Bulletin M-1.

AMERICAN MACHINE PRODUCTS, INC.
Manufacturers Since 1926
172 CENTRE STREET, NEW YORK 13, N. Y.

For more data circle 488 on Reader Service Card

new shop equipment . . .

manufacturer, the metallizing control panel automatically opens gas valves, lights gun and starts wire feed. The operator is not even required to touch the gun. All gas, oxygen and air controls and wire feed are set once. The operator then stops and starts the spraying operations with a simple turn of the control handle. Without disturb-

ing any adjustments, the operator can light, run, stop and relight as often as is required.

For more data circle 132 on Reader Service Card

★ ★ ★

COLLET ARBOR UTILIZES INCLINED FLATS

The N. A. Woodworth Co., 1300 E. 9 Mile Rd., Detroit 20, Mich., has announced a collet arbor with a

"Tork-lok" design which employs inclined flats in both collet sleeve and arbor shaft, eliminating the inherent clearances of the cone design. Positive drive is said to be afforded through these mated flats. Built-in safety stops control both expansion and contraction. Over-expansion is impossible, mini-



Cut Your Forming Costs for BRASS and all non- ferrous metals—

"We use B&W flat drills for one-operation inside forming, because they cut fast and do not choke. We sharpen them ourselves without changing the form or dimensions—they are removed and replaced in holders WITHOUT CHANGING THE SET-UP—and we get long runs between grinds.

"We internal-form compression fitting 'A' and brass bonnet 'B' much faster with B&W form relief cutters than with tooling formerly used.

"The economy of B&W flat drills was proven in our plant over six years ago and we use them for every application possible." Brass-Craft, Detroit.

Send your blueprints for prompt quotations to

B&W PRECISION PRODUCTS CO.

11393 E. Eight Mile Rd., P.O. Box 3865, Detroit 5, Mich.

For more data circle 489 on Reader Service Card



**View of Woodworth
Collet Arbor with
"Tork-lok" design**

mizing collet breakage. Contraction is restricted to maintain a preload which assures a metal-to-metal seal, excluding dirt and chips. The collet arbor is a stock item furnished in three styles; between centers, flange mounted draw-bar, and air operated draw-bar. Seventy-eight collets are available in a range from 0.500 to 2.562 inches.

For more data circle 133 on Reader Service Card

★ ★ ★

RESISTANCE SOLDERING TOOL PROVIDES 18 HEAT STAGES

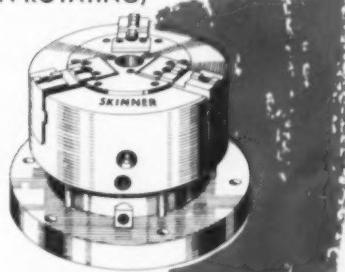
With a 6-stage selector switch used in conjunction with three secondary terminals, 18 heat stages or 18 different voltages from 1.3 to 5.1 can be obtained from the Model No. 626 Soldering Tool announced by The Luma Electric Equipment Co., P. O. Box 132-MS, Toledo 1, Ohio. The unit operates on 115-volt, 60-cycle current with a wide range of power—5 to 1,800 watts—and performs most efficiently and economi-



View of Luma Model No. 626 Soldering Tool

NEW SKINNER POWER CHUCK FIXTURE

(NON-ROTATING)



**POWERFUL ACCURATE!
FASTI DURABLE!**

Close coupling makes this Skinner Power Chuck Fixture the lowest, most compact unit of its type! Air-operated, it can be used on drilling, milling and transfer machines, and for assembly operations.

Special wedge action provides tremendous gripping power. Self-centering, self-locking. Available in 8", 10" or 12" dia., with 2 or 3 jaws. Operable with either a Skinner hand valve or a 4-way solenoid or foot valve. $\frac{3}{8}$ " pipe connections. Max. air pressure: 100 lbs.

Write for Bulletin PCF 67



THE SKINNER CHUCK COMPANY

210 Edgewood Avenue, New Britain, Conn.
For more data circle 490 on Reader Service Card

new shop equipment . . .

cally when used with carbon electrodes under $\frac{3}{8}$ inch in diameter. It has been designed to handle numerous soldering jobs from fine precision work to medium heavy industrial operations with over 16 styles of holders to choose from. According to the manufacturer, it



DIRECT INDEXING

Optional SWIVEL BASE converts a conventional dividing head into a universal work head or rotary table. Change-over is accomplished in seconds without tools or wrenches.

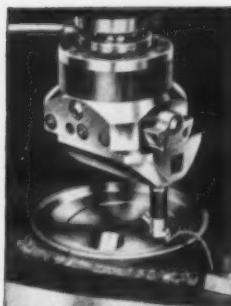
Also available in 10" - 12" sizes and in 10" - 12" spiral drive.

Write for Folder

CARROLL DIVIDING HEAD CO.

3525 Cardiff Ave. • Cincinnati, Ohio

For more data circle 491 on Reader Service Card



REASONS WHY MODERN ENGINEERS SELECT The Wohlhaupter **MASTERHEAD**

For Precision Work & Most Economical & Automatic Operation

- The MASTERHEAD does Boring, Facing, Recessing, Undercutting, Outside Turning, etc.
- It does this in One Operation and on One Machine.
- Automatic Feeds
- Increases the capacity of your present equipment.
- Increases Production, makes Better Finished Work.
- Nine Models available for work up to 36 $\frac{1}{4}$ " diameter.
Also taper cutting heads.

Sole Agent

KARL A. NEISE, 404 Fourth Ave., Dept. MMS,
New York 16, N. Y.

Send for illustrated literature

**NEISE
MODERN TOOLS**

For more data circle 492 on Reader Service Card

quickly supplies, at an amazing speed, concentrated heat at the exact area to be soldered.

For more data circle 134 on Reader Service Card

★ ★ ★

THROATLESS SHEAR PROVIDES FAST CUTTING OF ANY SHAPE

An electric powered throatless shear, incorporating a unique shearing action to provide fast, effortless cutting of any shape in metal up to 10-gauge mild steel, has been introduced by the Beverly Shear Mfg. Co., 3000 W. 11th St., Chicago 43, Ill. The shear is complete with its own base and supporting column which bring the shear to the most efficient and comfortable working height from the floor. By removing the supporting column, the shear may be used with the base only as a bench shear. The unit is easily portable and may be carried to the job when required. The eccentrically mounted cutter head imparts a downward-forward motion to the upper blade which shears the metal rather than punching through it. This provides fast, clean cutting while insuring long blade life and minimum blade sharpening. Accurate cutting to a line or template is possible because the operator may use both hands to feed and guide the work through the shear. Throatless design permits turning the sheet in any direction during the cut. Powered by a 60 cycle, 120



Beverly Electric-Powered Throatless Shear

volt, a.c. motor, which is direct-connected to the cutter head, the shear produces 1,725 cutting strokes per minute—correct speed to handle cutting, trim-

ming and slitting operations in any metal to the shear's capacity. The shear will slit 12-gauge mild steel at the rate of 15 feet per minute. Lighter gauges may be cut proportionately faster. High carbon, high chrome upper and lower blades are adjustable for wear and may be easily removed for resharpening or replacement.

For more data circle 135 on Reader Service Card

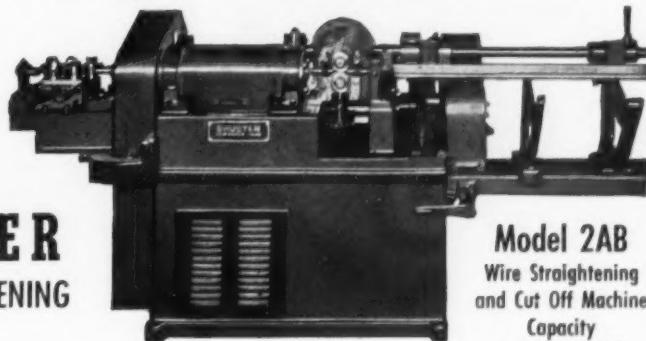
★ ★ ★

PROTECTIVE DIP COATING FOR INDUSTRIAL USE

Identified as "Seal Strip," a stripable protective coating for effectively protecting tools and metal parts against corrosion, chipping, all types of handling, heat, cold, humidity, and so on, has been introduced by Seal-Strip Corp., 57 Meeker Ave., Brooklyn 22, N. Y. The part is dipped into the Seal-Strip which dries in from 2 to 5 seconds,

★ ★ ★ ★

ECONOMY MINDED?



SHUSTER WIRE STRAIGHTENING and CUT-OFF MACHINES

• There is a SHUSTER for every wire straightening job from .025 to 1 $\frac{1}{16}$ " diameter. Over 30 models to select from.

Write today for our recommendation, describing your needs. No obligation whatever.

Mfd. by METTLER MACHINE TOOL, INC., 157 Adeline Street, New Haven, Conn.

Model 2AB
Wire Straightening
and Cut Off Machine
Capacity
3/16" - 3/8"
Basic Wire

For more data circle 493 on Reader Service Card

new shop equipment . . .

providing a thin film of tough, resilient protective coating. The coating can be removed by peeling, leaving no gummy residue. The coating is transparent which permits at-a-glance inspection and eliminates labeling. Whether in the tool bin or in transit, the coating acts as a shock-absorbing cushion for all types of tools, metal parts, machinery

and equipment. The coating may be remelted and used over and over again if not contaminated or overheated.

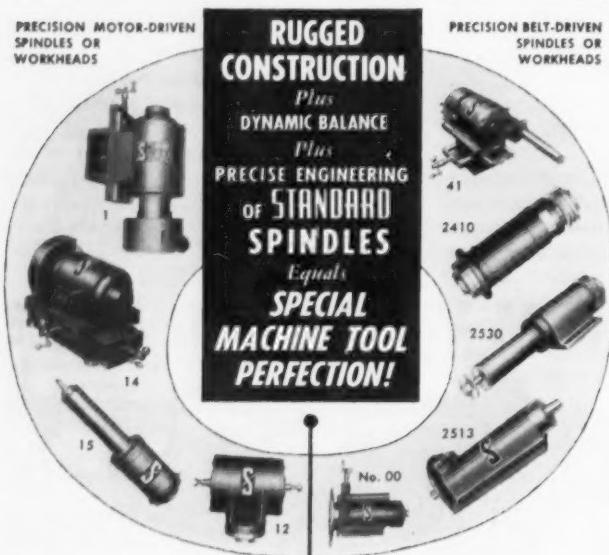
For more data circle 136 on Reader Service Card

★ ★ ★

ADJUSTABLE MAGNETIC WORKHOLDER IS USED WITH MAGNETIC CHUCK

An adjustable magnetic workholder which is designed for use on any machine equipped with a magnetic chuck has been announced by

Anton Machine Works, 1226 Flushing Ave., Brooklyn, N. Y. The workholder is constructed of alternating lamination of brass and iron, possessing high permeability and low residual magnetism. Fused to precision exactness, the laminations are held without pins or rivets. They match perfectly and cannot shift.



In nearly 500 American and foreign plants, STANDARD spindles are doing a top production job as modernizing applications on old machines, and in special adaptation for custom jobs.

SEE US IN
BOOTH 1838
CASTINGS CONGRESS
AND EXHIBITION
ATLANTIC CITY
MAY 3 THRU 9

Write for free literature today.

Since 1912

the STANDARD electrical tool co.
PRECISION SPINDLES AND MACHINE TOOLS

2487 RIVER ROAD • CINCINNATI 4, • OHIO

For more data circle 494 on Reader Service Card



Anton Adjustable Magnetic Workholder

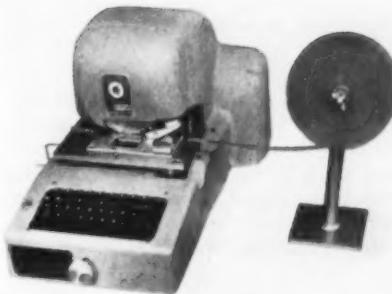
The adjustable holding block has a flat ground face, upon which the work is secured, that is rotated by hand to the required angle. The angle is quickly and easily set with the aid of a protractor and planer gage. For future reference, the position setting need only be recorded from the planer gage reading. The height setting may be varied in small angle increments to assure the accuracy necessary for precision machining. According to the manufacturer, maintenance is unusually simple as the mere removal of the rotating block exposes the bearing surfaces.

For more data circle 137 on Reader Service Card

★ ★ ★

ELECTRIC TYPEWRITER MARKS EMBOSSED STRIP TAGS

Designated as the "Automark," an electric typewriter for completely marking embossed strip tags, cutting



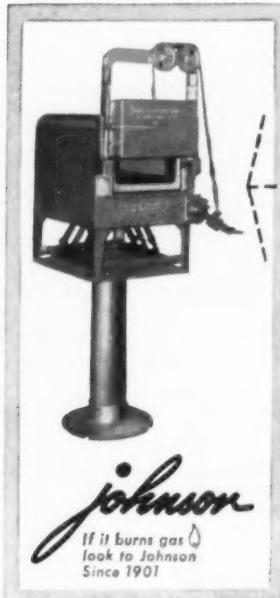
Defiance "Automark" Electric Typewriter

them off to the desired length and punching holes in each end of the tag by simply touching a key has been announced by Defiance Machine & Tool Co., 1920 S. Vandeventer Ave., St. Louis 10, Mo. According to the manufacturer, the typewriter is a fast and efficient machine for embossing strip tags. The standard keyboard is similar

★ ★ ★ ★

VERSATILE *johnson* NO. 706 FURNACE

For hardening, tempering and annealing steels



Six No. 5, Type A Bunsen Burners give this versatile furnace a 400° to 1800° F. range. Temperatures easily controlled. Ratchet-operated door opens upwards. Use with natural, artificial, mixed or bottled gas. Economical and efficient with all. Firebox 7" by 13" by 16½". 78,000 BTU'S per hour. (Natural gas)

Write for FREE Johnson catalog.

No. 706 Pedestal	\$312.00
Bench Model	\$287.00
No. 654 — smaller version, 4 burners, 5" by 7½" by 13½"	
Firebox.	
Pedestal	\$174.00
Bench Model	\$149.00
(All prices F.O.B. Factory)	

For more data circle 495 on Reader Service Card

JOHNSON GAS APPLIANCE COMPANY

571 E Ave., N.W.
Cedar Rapids, Iowa

new shop equipment . . .

to that of an ordinary office typewriter and just as easy to use. The machine will emboss any size character desired from $1/16$ to $1/4$ inch in size. A stand for holding a coil of strip stock is supplied as standard equipment.

For more data circle 138 on Reader Service Card

★ ★ ★

BORING BAR CARTRIDGE FEATURES POSITIVE POSITIONING

Portage Double-Quick Tool Co., 1041 Sweitzer Ave., Akron, Ohio, has announced the Sure-Bore Boring Bar Cartridge, a micrometer adjustable cutting tool with positive positioning, rigid clamping and no backlash in either direction. Graduations are always visible, and all inserts are carbide tipped, sharpened and ready for use. Accord-

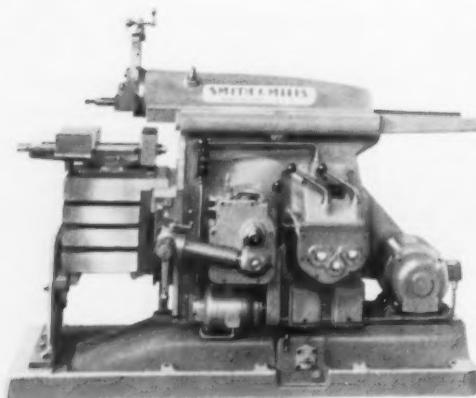
ing to the manufacturer, it is unusually simple to make boring bars, face mills, fly cutters and other cutting tools requiring precision adjustment in a matter of minutes with the Sure-Bore Boring Bar Cartridge. Boring sizes range from 1 to $5\frac{1}{2}$ inches, with $1/4$, $\frac{3}{8}$ and $\frac{1}{2}$ -inch tool bits.

For more data circle 139 on Reader Service Card

★ ★ ★

SMITH & MILLS SHAPERS

for production and tool room



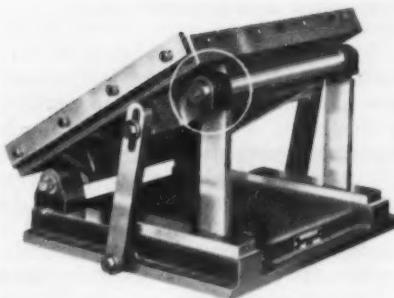
Compare Smith & Mills with any other shaper for versatility, speed, cutting power and precision performance. Compare and you'll buy Smith & Mills—famous for high quality shapers since 1888. Write or wire for prices, deliveries, repair parts or field service. Smith & Mills Shaper Division, Nebel Machine Tool Corp., Cincinnati 25, Ohio.



For more data circle 496 on Reader Service Card

12-INCH SINE PLATE FOR HEAVY ANGULAR MACHINING

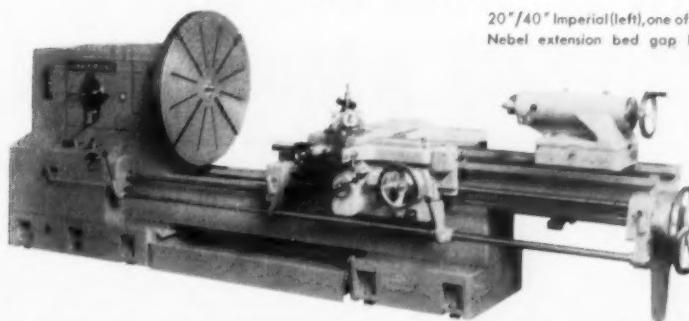
A heavy-duty 12-inch square sine plate, which is said to offer sufficient rigidity for heavy angular milling, boring and drilling operations, along with the precision required for the positive, repetitive accuracy demanded for inspection work, has been announced by Omer E. Robbins Co., 24800 Plymouth Rd., Dept. B-6, Detroit 39, Mich. The entire Robbins sine plate line now incorporates the "Perma-Flat" Swivel Block. Two of these swivel blocks are located at the ends of the sine bar rolls. Proper gage blocks to set the sine plate to the desired angle are placed between the swivel blocks and gaging pads in the base plate. Thus, weight of the workpiece and top plate is distributed evenly over the gage block surfaces, rather than single line contact. This is said to contribute to long life for both the sine plate and the gage blocks.



Robbins Heavy-Duty 12-Inch Sine Plate

Any compound angle can quickly be set up by using two of these sine plates together, in any combination of right and left-hand angles. The two sine plates will always remain in position, since bolt holes in the base plates assure secure attachment of one unit on the other. The non-magnetic top plate has both tapped holes and T-slots for

* * * *



20"/40" Imperial(left), one of three
Nebel extension bed gap lathes

Nebel double duty extension bed gap lathes

You can (1) turn your outsize, odd-shaped parts in the wide, deep gap of Nebel extension bed gap lathes. And (2) with the gap closed, you can do all your engine lathe work, too. Double duty means lower capital investment, more efficient use of floor space. Sizes 20"/40" and 28"/50". Nebel removable block gap lathes 16"/27", 20"/30", 25"/40"; engine lathes 16" to 36". Write for bulletins, Nebel Machine Tool Corp., Cincinnati 25, Ohio.



For more data circle 497 on Reader Service Card

new shop equipment . . .

convenient clamping of work. Top and base plate are ground flat and parallel to toolroom accuracy. The 12-inch square top plate is set up on 10-inch roll centers. Closed height is 5 inches, angular accuracy is plus or minus 10 seconds and maximum angle setting is 60 degrees. The unit weighs 95 pounds. For more data circle 140 on Reader Service Card



RADIANT HEATING UNITS FOR INFRARED ENERGY

An unusually wide range of application is the principle advantage offered by two types of radiant heating equipment introduced by The Fostoria Pressed Steel Corp., Fostoria, Ohio. The new-style radiant heating components include Quartz Lamp Oven Sec-



Two Types of Fostoria Radiant Heating Units

tions and Radiant Rod Oven Sections, both designed for easy assembly into complete infrared ovens. The quartz lamp equipment was developed to accommodate an entirely new source of radiant energy particularly suited to high temperature applications — the T-3 Quartz Lamp, which makes pos-

MULTIPLE DRILLING with a . . .



MULTI-DRILL

**Increases Capacity Up to 800%
ADJUSTABLE TO ANY HOLE PATTERN
... FITS ANY DRILL PRESS**

If your production requires drilling from 2 to 8 holes in a work piece, a MULTI-DRILL will cut costs and speed output up to 800%. The MULTI-DRILL is universally adjustable to any hole pattern—is compactly built to permit easy, unhampered operation with drill jigs or other special fixtures. Ruggedly built to take the wear and tear of high production work, the MULTI-DRILL will handle your long and short run multiple drilling jobs with ease and economy. The MULTI-DRILL will drill on hole centers as close as $\frac{1}{2}$ "—handle drill sizes up to $\frac{3}{8}$ " in steel. Special adaptations available.

**COMMANDER MFG. CO.
4224 WEST KINZIE ST.
CHICAGO 24, ILL.**

Product of Commander — Builder of Production Tools

For more data circle 498 on Reader Service Card

sible product temperatures in excess of 1,000 degrees F. The T-3 quartz lamp has a high temperature (4,000 degrees F.) tungsten filament, like the G-30 Infrared Lamp; but the filament is sealed in an inert gas atmosphere within a rugged, translucent, fused quartz shell. This design permits high radiation efficiency. Linear in shape, with metal sealed ends, the T-3 quartz lamp is said to have a rated, trouble-free burning life in excess of 5,000 hours. The T-3 quartz lamps are moisture-proof highly resistant to impact and vibration and are practically impervious to thermal shock. Ideal for many industrial processes including drying, curing, degreasing, baking and preheating, the quartz lamp equipment is especially recommended for high temperature, short cycle applications where instantaneous response is needed.

The radiant rod equipment, incorporating sheathed metal elements, was developed to meet the need for an efficient, low-cost far infrared unit for industrial applications. Simple in design, yet rugged in construction, the radiant rod oven sections are dur-

able all metal units which, it is claimed, can be quickly interlocked to form oven walls of high intensity.

For more data circle 141 on Reader Service Card

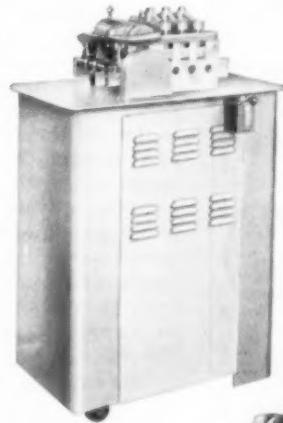
★ ★ ★

CONVECTION OVEN PROVIDES CONSTANT AIR WEIGHT CIRCULATION

Designated as the Con-Wate Ultra-Temp, a mechanical convection oven

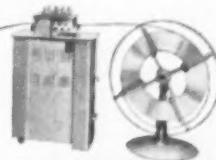
Economy • Dependability **WITTEK**

STOCK STRAIGHTENERS



This typical Wittek automatic production feeding setup includes

—Wittek roll feed mounted on the punch press, Wittek stock straightener, and Wittek self-centering reel stand.



Used in conjunction with a reel stand and automatic feed for punch presses, the Wittek Stock Straightener is a self-contained, motor-driven unit designed for maximum efficiency in the continuous straightening of coiled stock. Standard models handle stock with widths up to 12 inches. An infinitely variable speed drive permits any desired straightening speed so that the proper slack is maintained in the straightened strip between the unit and the press feed.

Write for full particulars

WITTEK Manufacturing Co.
4322 W. 24th Place • Chicago 23, Illinois

Production
Feeding
Equipment

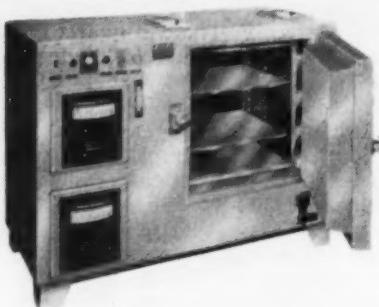
5577



For more data circle 499 on Reader Service Card

new shop equipment . . .

which is designed to automatically provide a constant air weight circulation at all temperatures to provide maximum heating efficiency has been announced by Blue M Electric Co., 138th & Chatham St., Blue Island, Ill. The oven has a temperature range to 1,200 deg. F. According to the manufacturer, the key to the oven's efficiency



Blue M Con-Wate Ultra-Temp Convection Oven

COLLIS ACCURACY
DURABILITY SERVICE

SLEEVES
AND
SOCKETS
AND A
complete line of COLLETS

• COLLIS Taper Tools are made by men skilled in this type of manufacture. Users get long satisfactory service from COLLIS Equipment and find the answer to all drilling, reaming, and tapping needs in the COLLIS line. We can give prompt service on orders for Lathe Centers, Arbors, Drill Drifts, and Magic Type Chucks as well as on Sleeves and Sockets and Collets.

THE COLLIS CO.
DEPT. A, CLINTON, IOWA

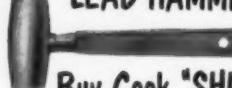
For more data circle 500 on Reader Service Card

320 modern machine shop

is an automatic control damper which progressively and automatically permits more air into the working chamber as the temperature rises. This compensating feature for loss of air weight is due to the unusual blower system and damper. The system features a larger than usual alloy blower wheel; however, no increase in motor horsepower is required. With horizontal flow, power selector switch and electronic indicating and controlling pyrometer, the oven provides maximum temperature uniformity from 150 to 1,200 degrees Fahrenheit.

The interior of the oven is of stainless steel, and the exterior is of heavy gauge steel with a heavy steel front designed to prevent warpage at elevated temperatures. For minimum loss of heat, the oven utilizes 5½ inches of

LEAD HAMMERS—



Buy Cook "SHUR-GRIP"



They're a MUST in every shop where many blows have to be struck without marring surfaces. Available with "SHUR-GRIP" drop forged handles.

Write for circular and prices

LAWRENCE H. COOK, INC.

67 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.

For more data circle 501 on Reader Service Card

April, 1956

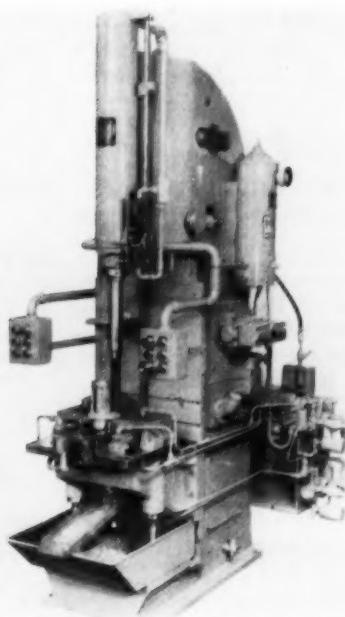
dual Therm-O-Block insulation. The double-wall constructed door has a bellows-type leak-proof seal of stainless steel. The oven is available in three standard sizes.

For more data circle 142 on Reader Service Card

★ ★ ★

HYDRAULIC HORNING-TYPE PRESS HAS CONTINUOUS AUTOMATIC CYCLE

American Broach & Machine Co., Ann Arbor, Mich., has announced a hydraulic horning-type press with continuous automatic cycle for broaching 30 external involute gear teeth on the o.d. of a bronze automotive synchronizer ring. The broaches for the machine are mounted in a stationary broach pot, through which the part is pushed. Ten



American Hydraulic Horning-Type Press

April, 1956



A BETTER BORING BAR

because our method of broaching square holes makes a better fit for the tool bit. This means more rigidity and longer life, especially with tungsten carbide.

Square hole sizes range from $\frac{1}{8}$ " up to and including $\frac{3}{4}$ ".

TYPE "B" & "C" CUTTERS



A strong rigid serrated 2-bladed cutter-located in the bar with a taper pin. Bores holes accurately to close limits. Can be expanded and reground giving long life. Sizes $\frac{7}{8}$ " dia. up to 6".



A simple 2-bladed reaming cutter. Can be expanded and reground. Located in the bar by a hardened V. This V never has to be reground as blades are expanded. Fits other bars with slots $\frac{1}{8}$ " x $\frac{1}{8}$ " $\frac{1}{8}$ " x $1\frac{1}{8}$ "
 $\frac{1}{8}$ " x 1" $\frac{1}{8}$ " x $1\frac{1}{2}$ "

THE DETROIT BORING BAR CO.

688 E. FORT ST.

DETROIT 26, MICH.

Established



1927

For more data circle 502 on Reader Service Card

modern machine shop 321

new shop equipment . . .

American H.S.S. 30 involute spline broach rings are mounted in the pot. The pot also acts as a guide for the push bar during the broaching stroke. An air-operated automatic slide, interlocked to the machine cycle, carries the parts from the tube feed to broaching

position over the broach pot. Stripping fingers and an ejection device automatically strip and eject the part below the pot. The parts are fed to the slide by a gravity tube feed. A single spline inside the tube radially locates the notched parts.

With the machine running on continuous automatic cycle, the operator only has to keep the magazine feeding the slide filled with parts. Parts are placed in the tube feed indexed by the spline. The slide picks up a part from the tube and moves it into broaching position. The ram moves the push bar down, pushing the part through the broach pot, broaching 30 involute gear teeth on the o.d. At the end of the broaching stroke, the stripper fingers move in between the part and the broach pot, stripping the part from the push bar which is returned by the ram. A plunger then moves out, ejecting the part down the discharge chute. At 100 per cent efficiency, production is approximately 300 parts per hour.

For more data circle 143 on Reader Service Card



CONVECTION FURNACE ASSURES TEMPERATURE UNIFORMITY

A line of Temperite Convection Furnaces with a temperature range to 1,350 deg. F. has been announced by Hevi Duty Electric Co., Milwaukee 1, Wisc. The furnaces are designed to assure

**Save
80%**

**Machine
Moving
Time**

MIGHTY MOVER
heavy duty dollie

- Load capacity to 100,000 lbs.
- Top plate swivels, 360° directional control
- Nothing to wear out—nothing to maintain
- Two 4-inch roller bearing cast iron dollies

MIGHTY MOVER CO.

1478 S. Milwaukee St. • Denver 10, Colorado

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INSTANT ACTION

by HARTMANN

RAPIDSET

All Purpose Tool Room And Machine Shop Vises.

The JAWSET

Adjustable Pressure Production Vise.
For Information Write Dept. M.

Hartmann Mfg. Co., 1637 Goold St., Racine, Wis.

For more data circle 504 on Reader Service Card

temperature uniformity in all parts of the work chamber. Forced circulation by a high speed fan and a special alloy baffle which directs the flow of air, is said to assure positive circulation. The heat is transferred rapidly and uniformly from the heating elements to the work. The sturdily-constructed furnace shell is insulated with preformed layers of graded insulation to reduce radiation loss.

According to the manufacturer, low cost, economical operation is achieved because the electric heating units are placed on the sides of the work chamber. No heat is lost up a flue or from the circulation of hot gasses outside the furnace chamber. The long-life heating elements are of high grade coiled nickel-chromium wire held in ceramic

refractories. The Temperite Convection Furnace is available in nine standard sizes.

For more data circle 144 on Reader Service Card

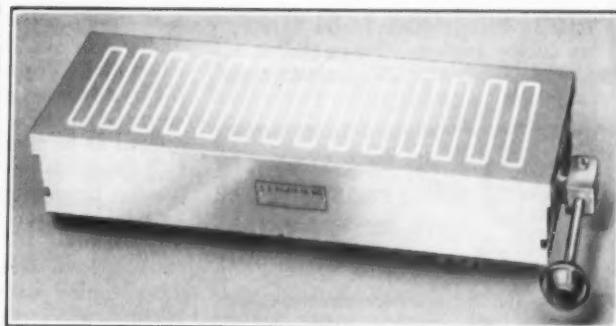
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ELECTRIC ARC ETCHING UNIT IS TRACER GUIDED

The marking of extremely hard surfaces is said to be possible by a tracer-guided electric arc etching unit manu-

Walker Chucks

You May As Well Have the Best



Pioneer in the making of magnetic chucks, Walker engineers have the know-how to produce chucks that have the proud distinction of being the best in the world.

Walker Permanent Rectangular Chucks are made in nine standard sizes from 4" x 8" to 12" x 24" and larger for special applications.

Walker Rotary Chucks are made in nine sizes from 4" to 16" standard diameter and larger sizes such as 48" diameter, the largest in the world.

Swiveling Chucks are made in three sizes from 4" x 8" to 8" x 24".



Hevi Duty Temperite
Convection Furnace

O. S. WALKER CO. INC.

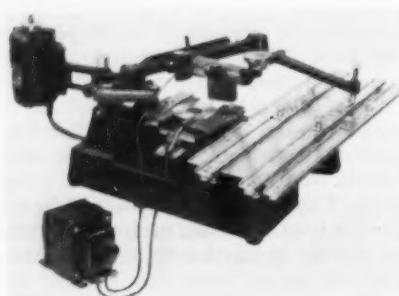
WORCESTER 6, MASSACHUSETTS

Original Designers and Builders of Magnetic Chucks

For more data circle 505 on Reader Service Card

new shop equipment . . .

factured by New Hermes Engraving Machine Corp., 13-19 University Place, New York 3, N. Y. Electric arc etching, it is claimed, offers the high legibility of a clean black identification on tools and parts made of hardened steel and steel alloys. According to the manufac-



New Hermes Tracer-Guided Engravograph equipped with electric arc etching unit

JIG BORING
and
Large Precision Machining
Done to your specifications
We Have 21 Jig Borers

KIDDE PRECISION TOOL CORP.
15 LOCUST AVENUE, ROSELAND, N. J.

For more data circle 506 on Reader Service Card

IF YOU SHIP, STORE, OR HANDLE TOOLS OR METAL PARTS, HERE IS LOW-COST Guaranteed PROTECTION

Seal-Strip

DIP IT! SHIP IT! STRIP IT!

DIP Product into tank of melted Seal-Strip. Dries in 2 to 5 seconds. Provides humidity resistant, salt-spray resistant, non-corrosive protection.

SHIP Seal Strip dries away with necessity for packing in excelsior, greases, or sawdust. For air shipping, use 100% Seal Strip, shipping weight . . . OR USE FOR TROUBLE FREE STORING.

STRIP The seal strip is one sheet. Reclaim, remelt, and re-use.

Best-Strip Crystal Clear or Balde Clear Coatings are transparent. Eliminate need for tagging. Completely with and has been approved under U. S. B.S.T. SPEC. JAB-C-109.

For information write:
SEAL-STRIP CORPORATION
857 Meeker Ave., Brooklyn 22, N. Y.

For more data circle 507 on Reader Service Card

turer, the marking of rounded surfaces, convex or concave, as well as irregular contours, is considerably simplified by this process. The marking leaves no burrs. A further important advantage is that tracer-guided electric arc etching allows the marking of parts in a finished state. For lettering or numbering highly stressed parts which cannot be stamped or engraved, the attachment is offered as an ideal method.

Because no skill is required to operate the Engravograph, any worker can employ the arc etching attachment almost at once. It is quickly and simply interchanged with engraving spindle. The etching equipment, consisting of a transformer and an etching spindle, is designed for use with the portable tracer-guided Engravograph. The elec-



MASTER GRIPPING CLAWS System Hubner

WHY use them?

1. Clamping action Vertical as well as Horizontal—pressing workpiece down directly on the machine table. No hammering and still no air between.
2. Gain more working room.
3. Faster and more secure setups. Easier to handle.
4. Unlimited jaw opening.
5. No straps overlapping on the workpiece; more machining surface.
6. Extremely versatile—take light cuts or heavy cuts, use on small machines or heaviest production machines.

Exclusive Agents

KARL A. NEISE
404 4th Ave., Dept. MMS,
New York 16, N. Y.

NEISE MODERN TOOLS

For more data circle 508 on Reader Service Card

tric arc etching unit is available as supplementary equipment with the conventional engraving machine.

For more data circle 145 on Reader Service Card

★ ★ ★

KNURLED HEAD SWIVEL-PAD CLAMP

Vlier Engineering, Inc., 8900 Santa Monica Blvd., Los Angeles 46, Calif., has announced the development of a knurled head swivel pad clamp for use where finger-tight clamping is sufficient. Except for the new knurled head, the tooling accessory is identical with the Vlier Socket Set Swivel Pad Clamp now widely used for holding parts in jigs and fixtures. The wide head of the new knurled head model is said to



Vlier Knurled Head
Swivel-Pad Clamp

assure good gripping and fast screw run-in, saving considerable clamping time where finger-tight is tight enough.

Like the Vlier Socket Set Swivel Pad Clamp, the new knurled head model features the unique ball-joint pad construction which provides unusually smooth angle adjustment and rotation of pad. The pad swivels $7\frac{1}{2}$ degrees each side of the center line in all directions to accommodate off-angle surfaces. The large, flat pad face assures

PRECISION BEARINGS

put long life in

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Specify IDEAL Live Centers and get custom-engineered performance from standard models. Your IDEAL distributor stocks them in a wide range of models and tapers. IDEAL Live Centers are guaranteed to match the accuracy and capacity of your lathe!

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For more data circle 509 on Reader Service Card

new shop equipment . . .

tight clamping. The body is made from heat-treated alloy steel, and is Du-lited for rust proofing. It is available in 1½ and 2 inch screw lengths, and five screw diameters.

For more data circle 146 on Reader Service Card



VERTICAL CHUCKERS FEATURE LARGE CAPACITY

The National Acme Co., 183 E. 131st St., Cleveland 8, Ohio, has introduced a vertical multiple-spindle hydraulic chucker to be marketed under the name Acme-Ryder. This chucker is said to be the answer to the increasing demand for large capacity verticals built to the same exacting standards established by Acme-Gridley horizontal

machines. Design of the machine is based upon that of Thomas Ryder and Son, Ltd., Bolton, England, combined with National Acme's experience to adapt it to American standards of performance.

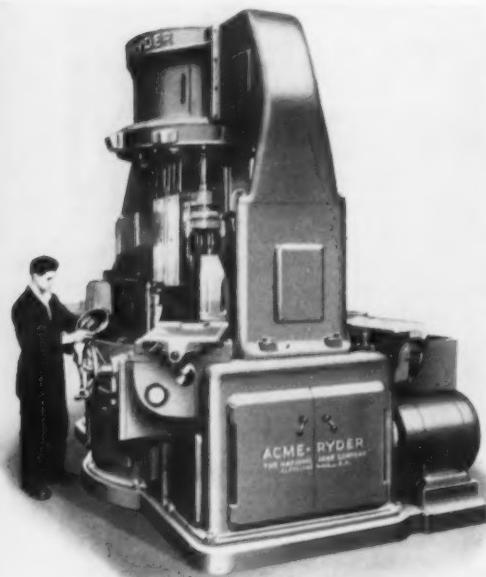
First of the new vertical chuckers is an eight-spindle model equipped with 14-inch capacity chucks, eight turning slides and four cross slides. In addition, four "auto cross slides" can be operated on the vertical turret at one time to provide greater tooling adaptability for production machining of large forged and cast workpieces. A six-spindle model with 17-inch capacity chucks, six vertical turning slides and four cross slides will also be available.

The cross slides complement the vertical end-working slides and provide flexibility and additional tooling operations. Because the independent cross slides of the Acme-Ryder are mounted on the lower frame and actuated from cam drums located directly beneath them, they provide maximum support for the heaviest forming cuts, as well as cross-facing or necking operations on the surface of the piece.

Machine power is designed not only to make use of the most modern cutting tools to best advantage, but also to provide an ample reserve to accommodate future tooling advancements. Standard spindle speed range is 32 to 628 r.p.m. Three spindle speeds are available at each spindle position with each set of pick-off gears, providing satisfactory speeds for various cutting requirements.

Positive indexing of the spindle carrier is by means of an independent indexing motor with hydraulically-operated locking and clamping at completion of index. Change-over from single to double index (or vice versa) is accomplished quickly by the removal or addition of a cam on the indexing tapet shaft.

An electro-hydraulic system not only provides a convenient means of actua-



Acme-Ryder 14-Inch Eight-Spindle Vertical Hydraulic Chucking Automatic

tion and control, but also enables a number of electrical, hydraulic and mechanical interlocks to be embodied as safety devices to protect both machine and operator. Functions performed hydraulically include opening and closing of chucks; engaging and disengaging clutches in the spindle drives; applying brakes at the loading stations, providing a reverse motion of the carrier to bring it back against the locating catch after indexing, then actuating a wedge to hold the carrier in that position; and clamping the carrier during cutting operations.

Machine controls are conveniently located near the loading station and are duplicated at the rear for ease in setting up. A master timing cam drum controls the completely automatic machining cycle, operating switches for the entire electrical circuit including the electro-hydraulic circuits. Frame design employs arch-type construction supported

by heavy columns to insure rigidity and permanent toolslide alignment. Access panels in the top housing, columns and base permit easy entry for adjustment and service. Weight of machine without tooling is approximately 60,000 pounds.

For more data circle 147 on Reader Service Card

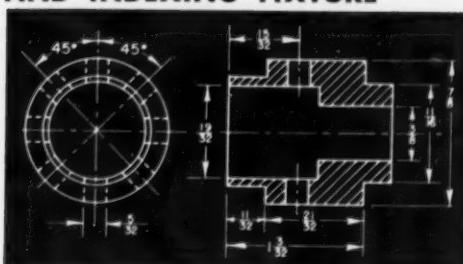
★ ★ *

TURN-TABLE BASE FOR USE WITH ANY BENCH-TYPE GRINDER

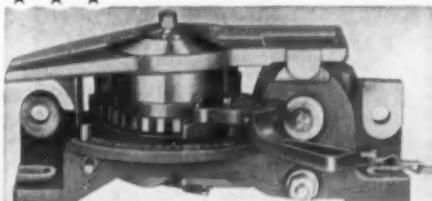
For use with its bench-type machines, Thomas Prosser & Son, Felton Bldg., Tenafly, N. J., has introduced a turn-table base which is designed to greatly facilitate the use of any bench-type grinder. By means of an unusual quick-acting positive clamp, the grinder may be turned so that either end faces the operator in the most convenient position, thus facilitating instant change from roughing to finishing with-

★ ★ ★ ★ ★

CUT COSTS ON SECONDARY OPERATIONS WITH THE **DEARBORN** AUTOMATIC CHUCKING AND INDEXING FIXTURE



This piece was made from Brass. It was necessary to drill all holes from the outside to minimize the burring time. Production was about 100 pieces per hour or 800 holes per hour.



Features:

1. Work held by collets
2. Automatic opening and closing
3. Work automatically ejected
4. Automatic indexing if required
5. Three models with capacities from $1/32"$ to $2"$

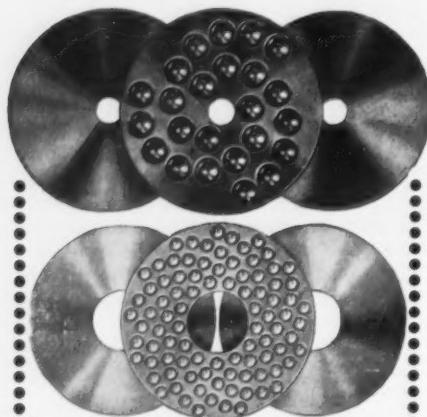
Write for illustrated data.
Send blueprints or specifications
of work.

J. W. DEARBORN
ANSONIA • CONN.

For more data circle 510 on Reader Service Card

new shop equipment . . .

out requiring the operator to move from one end of the machine to the other. The turn-table base, it is claimed, also permits mounting the grinder anywhere on a long bench, up against a wall, and so on, making it possible to locate the grinding machine at the most conve-



BALL THRUST BEARINGS

STANDARD SIZES ARE SHOWN IN OUR GENERAL CATALOG, SENT UPON REQUEST.

Serving Industry for Over 43 Years.

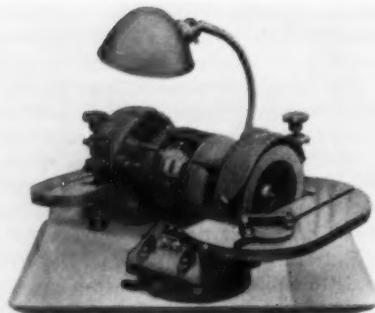
THE GWILLIAM COMPANY

INCORPORATED 1912

358 FURMAN ST.

BROOKLYN 1, N. Y.

For more data circle 511 on Reader Service Card



Prosser Bench-Type Grinding Machine mounted on a Prosser Turn-Table Base

nient point nearest the work. The turn-table base can be furnished either with or without a drip pan and will accommodate either the Prosser Model AA Carbide Grinder or the Prosser Model AP Precision Grinder.

For more data circle 148 on Reader Service Card

★ ★ ★

EXTENSION SPRING ASSORTMENT

Intended to eliminate the tedious process of winding springs, an assortment of 29 extension springs, ranging from $\frac{1}{8}$ to 1 inch in diameter, has been announced by Reid Tool Supply Co., Muskegon Heights, Mich. Each spring is made of music wire and has an 11 inch free length with hoops or hooks on each end. It is a simple matter to

More Capacity per Dollar

MODEL J-24—Capacity 24" x 24". Largest capacity per dollar of any comparable saw. Completely hydraulic. Variable speed drive. Rugged, all welded steel construction. Trussed guide posts for extra rigidity. Big $1\frac{1}{4}$ " blade on four band wheels handles large or small jobs with ease. Complete with coolant.

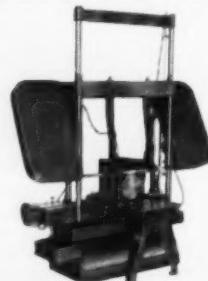
Write for FREE CATALOG!

Dept. M

W. F. Wells and Sons
Metal Cutting Band Saws

THREE RIVERS
MICHIGAN

MODEL J-24



For more data circle 512 on Reader Service Card

select a spring in the size wanted, cut to the length desired and form a loop or hook on the cut end.

For more data circle 149 on Reader Service Card



LOCK AND EJECT ADJUSTABLE ADAPTERS

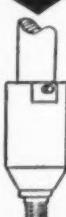
Scully-Jones and Co., 1909 S. Rockwell St., Chicago 8, Ill., has announced a new line of lock and eject adjustable adapters designed for use on multiple-spindle machines doing drilling, tapping, and similar jobs. High holding power, accuracy, quick and easy adjustment and trouble-free operation are features of the new tools. Contributing to these qualities is the unique Scully-Jones lock and eject mechanism which is said to speed and simplify tool changes and minimize tool pull-out. In order to change a tool, the operator need merely turn the threaded nut to unseat the chuck which grips the cutting tool. When the new tool is in place, the nut is turned to its locking position, and there is no need for pounding

or excessive torsion to lock the tool in place. The threaded nut is fitted with spanner wrench holes on its outside diameter, as well as its face, to speed tool changes.

A new four-slot design lock and eject chuck is designed to furnish four-way gripping action with a true collet effect to hold the cutting tool in place and minimize damage due to pull-out even on deep oil hole drilling on crank shafts. The tools are made with a de-



Multiply Thread Strength in Soft Materials



Tap-Lok Inserts provide increased thread strength in this aluminum casting—a cylinder for a 2-cycle engine. Two Inserts are shown plainly above, installed in the casting. Three others are on the opposite side of the cylinder

Tap-Lok Inserts are threaded bushings of steel or brass for use in relatively soft metals, plastics and other materials. Self-tapping and friction-locking in a single operation, they eliminate the need for separate hole preparation or secondary operations.

Designed primarily for original equipment installation, they are also excellent for salvage and thread repair.

Write for additional information.

Also manufacturers of
Groov-Pins for positive locking press fit.



GROOV-PIN CORPORATION

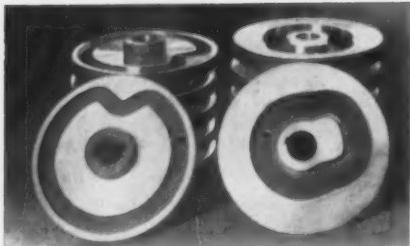
1135 Hendricks Causeway Ridgefield, New Jersey

For more data circle 513 on Reader Service Card

new shop equipment . . .

gree of accuracy which allows cutting tools to run true within 0.002 inch. A wide range of sizes of drills, reamers, and taps may be accommodated by simply changing chucks in the lock and eject adapters. The adjustable adapters are precision tools made from alloy steel, carefully hardened for long wear,

Rowbottom for Cams



Any type...any quantity...promptly

Half a century's specialized experience combined with modern facilities are your assurance that Rowbottom can handle your most exacting requirements. Submit specifications . . . ask for estimates.

THE ROWBOTTOM MACHINE CO.
WATERBURY, CONNECTICUT

Also Cam Milling and Grinding Machines for producing cams of all types. Ask for details.

For more data circle 514 on Reader Service Card

wide range of sizes of drills, reamers great torsional strength and maximum accuracy.

For more data circle 150 on Reader Service Card

★ ★ ★

FLEXIBLE SHAFT TOOL MAINTAINS SUSTAINED TORQUE UNDER LOAD

An improved high speed flexible shaft tool, designated as the "Super-Flex", for all types of production, bench finishing, deburring, tool and die grinding, sharpening and similar operations, has been announced by The Dumore Co., 1302 Seventeenth St., Racine, Wisconsin.

Driven by a $\frac{1}{4}$ -h.p. universal motor that develops 22,000 r.p.m., the tool has the power to maintain a sustained torque under load which is an ideal condition for carbide burr use. The shaft and sheath are said to provide smooth, vibration-free operation. The sheath consists of three layers—armored wire casing, wire braid and neoprene cover—and while it is designed for heavy wear, it operates smoothly when bent to as small as a 6 inch radius. Around the spun wire shaft is a bronze liner which acts as a bearing to confine rotation within a confined radius. It also lubricates the shaft. A threaded adapter spun to the sheath locks both to the handpiece. The freely rotating adapter is said to prevent kink-

A Simple Formula for Solving Tooling Problems

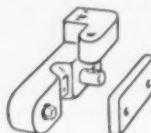
No need to start from scratch . . . use the HEINRICH Grip-Master Jig and Fixture base . . .

A + B

Simply add false jaws
and bushing plate.

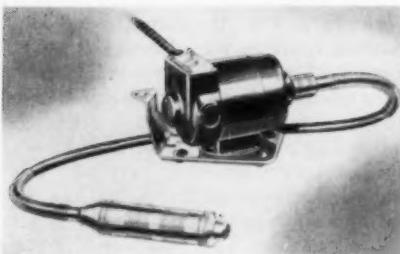
= C

Result . . . an accurate,
low-cost Drill Jig.



HEINRICH TOOLS, Inc. Dept. 116-D Racine, Wis.

For more data circle 515 on Reader Service Card



Dumore "Super-Flex" Flexible Shaft Tool

ing and entangling of the sheath, eliminating constant adjustment of work and position by the operator.

The handpiece is 6 $\frac{3}{4}$ inches long and weighs 14 ounces. It accommodates $\frac{1}{4}$ and $\frac{1}{8}$ inch shank-mounted wheels and points and carbide burrs up to $\frac{3}{8}$ inch in diameter by using rubber-flex collets. The aluminum housing is precision bored, and the spindle is hardened and accurately ground. Class 7

Super precision bearings are used. The handpiece is said to be cool operating and easy to use.

For more data circle 151 on Reader Service Card

★ ★ ★

SLOTTER RAPIDLY AND ACCURATELY MACHINES ALL METALS

Designated as the Model SM, a heavy-duty hydraulic slotter which is designed for accurate, rapid machining of all metals and which is available in 36 and 48-inch stroke-length sizes has been announced by Rockford Machine Tool Co., Dept. H., 2500 Kishwaukee St., Rockford, Ill. It is rigidly and powerfully constructed to provide ample strength to utilize the full power of the machine. One of the most important features of the machine is that all cross, longitudinal and rotary movements are full pendant-actuated and

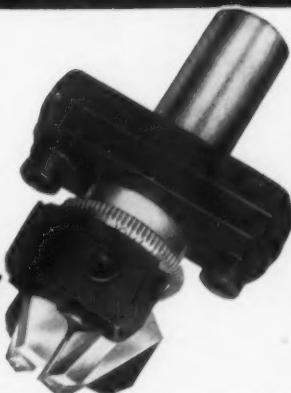
Compensates for Spindle Misalignment

The Midget Floating Holder Hollow Mill, flange type, has micrometric adjustment, and is designed to permit easy compensation for any spindle misalignment.

WRITE TODAY FOR CATALOG 20MM

It shows complete line of adjustable hollow mills. Our engineering department is at your disposal for special requirements.

KUTMORE ADJUSTABLE HOLLOW MILLS



CARL WIRTH & SON, INC.

1625 CLINTON AVE. NO.
ROCHESTER 5, N. Y.

For more data circle 516 on Reader Service Card

new shop equipment . . .

controlled. The machine is equipped with full hydraulic drive, having two speed ranges, with servo control to the pump so that cutting speed may be infinitely varied from zero to maximum in either range. Feeds are hydraulic, and they also may be infinitely varied from zero to maximum. Feeds and speeds are both controlled from the pendant.

Longitudinal, transverse and rotary movements are operated and selected from the push-button station of the machine. No levers are required for engagement of any feed or traverse movement. Two-speed traverse is available, enabling the operator to position the

work to a few thousandths without manual movements, although manual control of all movements is available from either side of the machine. The slotted is equipped with a built-in dividing head arranged for power operation. A predetermining counter automatically stops the table for any selected number of turns within one-tenth of a revolution. The position of upper and lower reverse dogs on the ram may be changed from the push-button station. The ram may also be locked from a button on the pendant, thus providing control of all movements directly from the pendant.

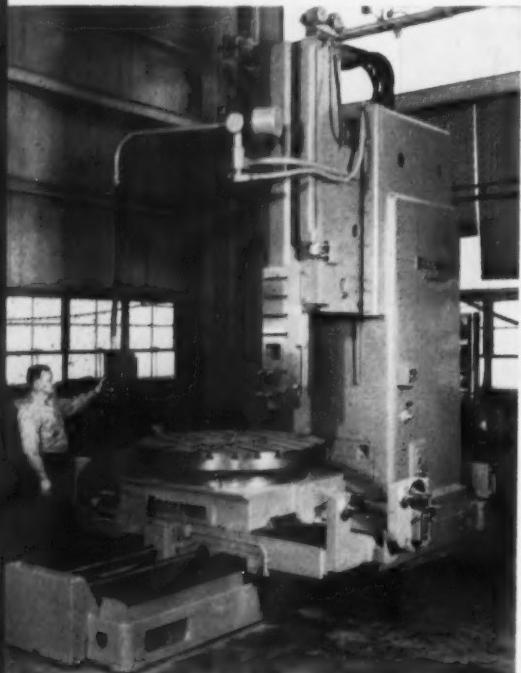
The pendant is a counter-balanced design, swinging to 240 degrees, thus permitting the operator to run the machine from any convenient position. The ram may be tilted up to 10 degrees. The toolholder is arranged with auxiliary clamping surfaces for maximum efficiency in holding the slotting bar. A hydraulic tool lifter is available as an optional accessory, as well as hardened and ground saddle ways and bed ways. A 40-h.p., variable delivery, radial piston pump is used for hydraulic power. Automatic pressure lubrication is provided to the ram ways, bed ways and saddle ways.

For more data circle 152 on Reader Service Card

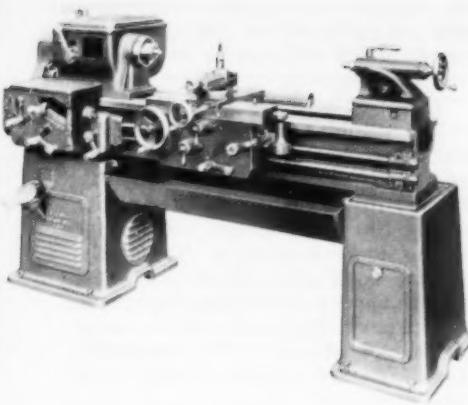
★ ★ ★

LATHE PROVIDES SPINDLE SPEEDS FROM 30 TO 1,500 R.P.M.

Designated as the Model VS, a 16-inch variable-speed engine and toolroom lathe which provides infinitely variable spindle speeds from 30 to 1,500 r.p.m. has been announced by the Carroll-Jamieson Machine Tool Co., Batavia, Ohio. The spindle is belt driven, running in extra width Timken bearings, and triple vee link belts provide maximum pulling power for both production and toolroom requirements. The machine affords a geared range of



Rockford Model SM Hydraulic Slotted in use



C & J Model VS Engine and Toolroom Lathe

speeds which are adaptable for the heaviest turning operations. The gearbox provides 48 separate threads and feeds with a thread range of from 3 to 184 per inch. Separate levers control

longitudinal and crossfeed positive-type clutches. The lathe utilizes large cross-feed and compound rest dials which are graduated to 250 thousandths. Both feed rod and lead screw are provided. The machine can also be furnished to swing 18 inches with bed lengths up to 14 feet.

For more data circle 153 on Reader Service Card

★ ★ ★

STANDARDIZED DOUBLE-END TRANSFER MACHINE

Automatic stock cut-off, simultaneous with double-end machining, is combined in a unit designed and built by The Motch and Merryweather Machinery Co., 888 E. 70th St., Cleveland 3, Ohio. The machine embodies automatic feed for bar stock to a circular sawing cut-off station and transfer facilities to two opposed secondary machining heads. Stock is fed to the stock stop,

IF you want to cut production costs
THEN without machining, you can:

- ANCHOR BUSHINGS IN DRILL JIGS.
- SECURE MAGNETS IN FIXTURES.
- ANCHOR SHAFTS IN ALNICO ROTORS.
- ALIGN AND SECURE SHAFT BEARINGS, ETC.

Simple procedures for above described in Bulletin A1—write for it today.

Visit Booth No. 236, Design Engineering Show, Convention Hall, Philadelphia, May 14-17, to see these and many other applications.

CERRO DE PASCO CORPORATION

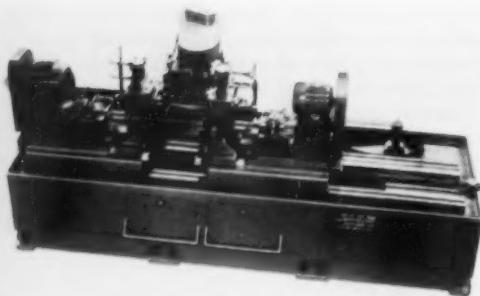


304 Park Avenue,

New York 22, N. Y.

For more data circle 517 on Reader Service Card

new shop equipment . . .



Match & Merryweather OO-T-C Transfer Machine for cut-off and double-end operations

which is set for a predetermined length. It is retained in a vise during the cut-off operation, as well as in the two transfer carriers. The transfer mechanism consists of two continuous chains to which the carriers are fastened. The cut pieces are indexed forward to the double end machining station. At this point, the pieces are positioned for end-wise location by hardened shoes and lifted from the carrier by self-centering, self-equalizing clamps and are held during the double-end machining operation. Upon completion of the work, the parts are lowered to the carriers by opening of the vises, and the index forward carries them to the discharge position. The stock stop, one chain car-

rier, vise and one secondary machining head are contained on a saddle which permits quick adjustment for lengths from 5 to 60 inches.

The cut-off is performed by the Triple-Chip Circular Saw cut-off method. Secondary machining heads can be equipped for centering, chamfering, turning, drilling or boring. Box mill turning can be combined with center drilling and chamfering. Two basic machine sizes give capacity of $\frac{1}{4}$ to $1\frac{1}{2}$ inch and 1 to 4 inch diameter tubing or solid stock. Hydraulic and electrical equipment conforms to J.I.C. standards. Magazine stock loading can be furnished, if desired.

For more data circle 154 on Reader Service Card

★ ★ ★

DIAMOND WHEEL IS UNUSUALLY FAST CUTTING

Clipper Diamond Tool Co., Inc., 21-G W. 46 St., New York 36, N. Y., has introduced a new bond for diamond wheels known as "Cera-Met." According to the manufacturer, the Cera-Met Wheel does not glaze even if carbide and steel are ground at the same time. It is said to cut unusually fast and maintain sharp corners for a long period of time.

Designed to eliminate frequent dressing, the Cera-Met bond actually wets and adheres to each diamond grain regardless of how fine, gripping it so



*for rapid slotting
OF STANDARD AND SPECIAL SCREWS*

The KENT SEMI-AUTOMATIC SCREW SLOTTER

Parts are inserted into a revolving disc which carries them past a slotting saw and ejects them into the pan of the machine.

Speeds and feeds are changeable to adapt machine for slotting any kind of metal. Handles all types of heads; also does light milling of similar parts.

Write for illustrated bulletin

The KENT MACHINE CO. • Cuyahoga Falls, Ohio
Drillers - Threaders - Slotters - Countersinkers - Bar Pointers

For more data circle 518 on Reader Service Card

firmlly that it cannot be knocked out—it must be worn down. After the diamond is worn flat, a "breakaway" action releases the diamond particle, thus exposing a fresh diamond edge. This action continues throughout the life of the wheel so that the grinding surface is always clean and sharp.

For more data circle 155 on Reader Service Card

★ ★ ★

SHEET METAL WORKER'S SNIPS AND SHEARS

Nine new sheet metal worker's snips and shears have been added to the extensive line of hand tools manufactured by Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y. Included are three compound leverage shears (for straight, right and left cuts), three straight snips and new combination snips.

The compound leverage shears multiply hand pressure to provide unusual cutting power with minimum effort. Eighteen gauge steel can be cut with ease. Featuring 52 serrations to the



View of Niagara Compound Leverage Shears, Straight Snips and Combination Snips

"TORQUE WRENCH" MANUAL

Sent upon request

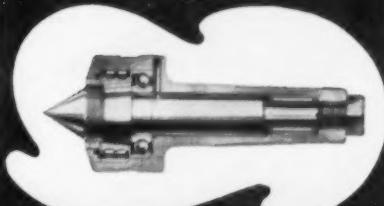
Formulas
Applications
Engineering data
Screw torque data
Adapter problems
General principle

P.A. *STURTEVANT* CO.
ADDISON *QUALITY* ILLINOIS

Manufacturers of over 85% of the torque wrenches used in industry

For more data circle 519 on Reader Service Card

NIELSEN Heavy Duty Live Centers



Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

Write for catalog
M on live centers

NIELSEN, INC. LAWTON, MICHIGAN

For more data circle 520 on Reader Service Card

new shop equipment . . .

inch, the drop forged steel jaws are curved to divert the sheared metal. The pliable plastic hand grips have stop posts to prevent hand slippage and to provide finger clearance. The three models can be quickly identified on a workbench or in a tool box by means

C A M S

Fully equipped modern machine shop with extensive Jig Boring, Surface Grinding, Horizontal Boring and Thread Grinding facilities as well as modern Cam Milling and Cam Grinding equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC.

23-16 44th Road Long Island City 1, N. Y.

For more data circle 521 on Reader Service Card

PRECISION PINS

Dowel — Straight
Countersunk — Taper
Made to Blueprint

CENTERLESS GROUND
TO $\pm .0001"$ ACCURACY
.030" to .125" Diam.
.125" to 2" Length
Complete Centerless Service
Since 1931

COMMERCIAL
CENTERLESS
GRINDING CO.
6605 CEDAR AVE. Phone EN 1-3412 CLEVELAND 3, O.

For more data circle 522 on Reader Service Card

336 modern machine shop

of three different hand grip colors.

The straight snips (in three sizes), adjusted accurately for long smooth cuts, are made of drop forged steel and heat treated to insure long lasting, keen cutting edges. The new combination snips (in three sizes) are especially designed for intricate pattern and scroll work. Made of drop forged steel, the inner faces of the "Duck Bill" jaws are sloped for cutting curves and irregular shapes.

For more data circle 156 on Reader Service Card

★ ★ ★

SAFETY HOIST HOOKS UTILIZE RUGGED LATCHES

Safety hoist hooks, which are designed to offer convenience, reliability and a long life of positive safety action, have been announced by J. H. Williams & Co., 410 Vulcan St., Buffalo 7, N. Y. The hooks utilize rugged latches which have powerful non-corrosive snap-springs. Loads cannot be jarred from the hook. The design is such that maximum throat opening is available, and the latches are of sufficient size, for each hook, to allow the operator ample gripping area so that fingers will not be exposed to the load carrying line.

The safety hoist hooks are heat treated after forging for maximum strength and toughness. To insure proper service at listed capacity, each hook after heat treatment is proof test-

CUT-CUTTING TIME

NORDEX

Sheet and Plate Cutter
speeds up cutting, slotting,
beading, folding and doz-
ens of other metal working
jobs.



Nord Corporation

12 SPRUCE STREET
NUTLEY, NEW JERSEY

For more data circle 523 on Reader Service Card

April, 1956



Williams "Vulcan" Safety Hoist Hooks

ed on a standard tension machine to 50 per cent beyond its rated safe-working load. The safety hoist hooks are available in both shank and eye patterns in a range of "safe-working load" capacities from 1,200 pounds to 30 tons. For more data circle 157 on Reader Service Card

★ ★ ★

AIR GRINDER FEATURES GRIP HANDLES SPACED 110 DEGREES APART

Designated as the Model 5V, a powerful air grinder, designed especially for use in foundries and other metal-working operations, has been announced by Thor Power Tool Co., Au-



View of the Thor Model 5V Air Grinder

April, 1956

KEO

STRAIGHT SHANK MACHINE COUNTERSINKS



HIGH SPEED STEEL 4 FLUTES

Cuts $\frac{1}{2}$ " to 1". Furnished with 60, 82 or 90 degree included angle. Specify desired degree of angle. Large stocks on hand.

Jobbers' Inquiries Invited

KEO CUTTERS

19326 Woodward - Detroit 3 Mich.

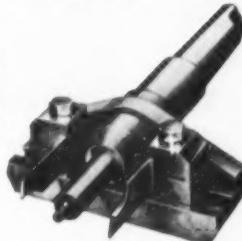
For more data circle 524 on Reader Service Card

Cut Costs on Hole-Cutting!

USE THE
NEW . . .

BOREMASTER

Finished holes
 $1\frac{1}{2}$ " to $11\frac{1}{4}$ "
diameter to a
depth of 8"
on your present
equipment.



BOREMASTER is not just another Trepanning Cutter, but a real heavy duty tool. Stock is removed in one piece eliminating waste. Remember . . .

TIME SAVINGS + MATERIAL SAVINGS
= COST SAVINGS

• Write us today for complete details!

**NEISE
MODERN TOOLS**

KARL A. NEISE
404 4th Ave., Dept. MMS,
New York 16, N. Y.

For more data circle 525 on Reader Service Card

new shop equipment . . .

rora, Ill. The grinder is completely redesigned from its one-piece housing to a newly developed air motor. It is available in speeds of 4,500, 6,000 and 8,000 r.p.m. and features an adjustable, positive-speed governor which is said to increase air economy and assure com-

plete safety under all operating conditions. A built-in exhaust muffler effectively reduces noise levels. An important design feature is that grip handles on the Model 5V are spaced 110 degrees apart. It is believed that this innovation will heighten operator convenience and, hence, increase efficiency. Other features include automatic mist oiling from a large-capacity reservoir, double-row, pre-loaded spindle bearings and hardened steel center plates.

Extra equipment and accessories, available with the Model 5V grinder, convert the tool from a vertical cup grinder to a sander, wire brush machine or depressed center, disc-wheel cut-off grinder. Available wheel guards include a compact rotating unit, an open-end cup wheel guard and a unit for cut-off wheels.

For more data circle 158 on Reader Service Card



HAND KNOBS



6 SIZES CAST-IRON

Tapped, Reamed
or Blank
Hex-shaped hub for
extra tightening

Write for catalog

**TIETZMANN TOOL
CORPORATION**

ENGLEWOOD, OHIO

DEPT. HK-1

For more data circle 526 on Reader Service Card

BALD EAGLE SINE BARS and PLATES

GUARANTEED

PRECISION*

at

**LOW
COST**



10" Hinged Sine Plate \$265.00

This new No. 1810 Hinged Sine Plate has our exclusive locking device for rigid setups, heavy duty side and end plates, and a .1000" step for small angles.

*All models guaranteed accurate within .0002" for center distance and parallelism. Made of finest materials, double normalized for maximum stability, precision ground for accuracy. Use with magnetic chuck or clamp work with tapped holes.

Write for literature and low prices on the complete line of Bald Eagle Sine Bars and Plates.

Call your dealer or wire collect
for immediate shipment

Bald Eagle Tool Co.

357 Minnesota St., St. Paul 1, Minn.

For more data circle 527 on Reader Service Card



LARGE DIAMETER BAR GAGES PROVIDE 0.0001-INCH ACCURACY

A series of large diameter bar gages, providing 0.0001-inch accuracy for inside or outside diameters as large as 36 inches, has been announced by Rimat Gage Co., 21 W. Dayton St., Pasadena, Calif. Incorporating a design whereby special inspection requirements can be included quickly and economically, the gages fill the gap be-

"Jorgensen"
REG. U. S. PAT. OFF.

and "Pony"
REG. U. S. PAT. OFF.

CLAMPS

ASK YOUR SUPPLIER.
send for free catalog.

ADJUSTABLE CLAMP CO.
the clamp folks / 436 N. Ashland, Chicago 22, Ill.

For more data circle 528 on Reader Service Card



View of Rimat Large Diameter Bar Gage

tween general purpose "stock" types and expensive special gages. The gages are capable of inspecting highly accurate large diameters at specific gage points, on shoulders or in grooves. If desired, infinite variability between 9 and 36 inches can be obtained. The gages can be furnished with portable masters in a common carrying case for use by field inspectors. Complete sets, answering needs of a few sizes over a wide range, can be supplied.

For more data circle 159 on Reader Service Card

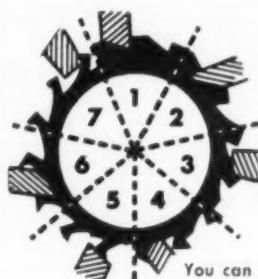
★ ★ ★

AUTOMATIC POWER WRENCH

La Salle Tool, Inc., 3840 E. Outer Dr., Detroit 34, Mich., has introduced a two-speed fully automatic power wrench with controlled torque. The wrench is synchronized with the machine cycle to provide for automatic engaging and disengaging of parts.

The LaSalle Automatic Power

Wrench is a self-contained unit, which is automatically lubricated and operates on conventional machine tool principles—with high speed, low torque approach; low speed, high torque clamping; and high speed, low torque return. It features a fluid motor drive, with a sight gage to indicate the fluid level. The fluid motor drive enables the user to clamp light parts, or parts with thin-walled areas, without the danger of fracturing the parts. Furthermore, the



Just think!

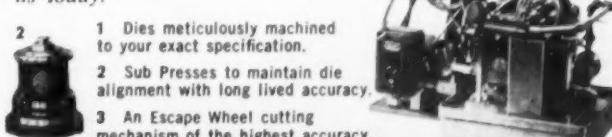
7 SEPARATE MILLING OPERATIONS ON THIS ESCAPE WHEEL

(Enlarged
View)

You can cut any size you require — from the very smallest, up to large size clock escape wheels.

If timing mechanisms are a problem you should know more about the Waltham Process. Many of the leading watch and clock manufacturers of the country are producing Escape Wheel teeth of complicated shape by the Process which is in brief: (1) Dies of precise dimension, (2) Sub Presses which are precision die sets for utilizing these dies, (3) A semi-automatic cutting machine of absolute accuracy to produce smooth-finished, close-tolerance escape wheels.

The complete story of the Waltham Machine Works Process and how it can help you with your timing mechanisms is yours for the asking. Write us today!



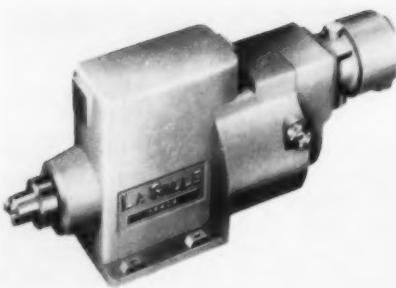
WALTHAM MACHINE WORKS, INC.
296 Newton Street, Waltham, Mass.

For more data circle 529 on Reader Service Card

new shop equipment . . .

clamping torque can be repeated from cycle to cycle within 10 per cent.

Designed to fit practically any special or standard machine, the LaSalle Automatic Power Wrench is mounted on a special mounting plate to permit



LaSalle Automatic Power Wrench

TINY TITAN
TWO-IN-ONE ADAPTER

CUT SET-UP TIME With Model No. 150 Magnetic Base Dial Indicator Holder

Mounts to flat surfaces or rounds down to $\frac{3}{4}$ " Dia.

Amazing Versatility

Send for Latest Bulletin

ENCO Manufacturing Co., Dept. 146
4524 W. Fullerton Ave., Chicago 39, Ill.

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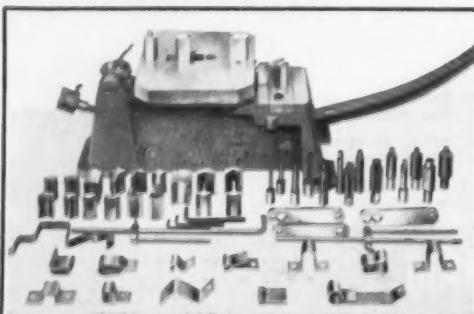
vertical, horizontal or angular mounting. Two standard sizes are available; namely, a smaller model, with a torque capacity from 0 to 800 inch/pounds and a large model with a torque range from 800 inch/pounds to 5,000 inch/pounds. To regulate and control the power wrench, a hydraulic power package with positive controls is provided.

For more data circle 160 on Reader Service Card

★ ★ ★

GASKET CUTTERS ARE LIGHTWEIGHT

The Cincinnati Tool Co., 1947 Waverly Ave., Cincinnati 12, Ohio, has announced the Hargrave No. 414 Handy Gasket Cutter and the Hargrave No. 415 Extension Gasket Cutter. The No. 414 cutter has a lightweight durable



For more data circle 531 on Reader Service Card

MultiformTM BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape. Clamps, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, Steel Rule Dies, Etc.

AIR OR HAND MODELS FOR UP TO $\frac{1}{4}$ " to 4" MATERIAL

Write for brochure which illustrates and describes the four bender models.

**J. A. RICHARDS CO.
Dept. 6-M Kalamazoo, Mich.**

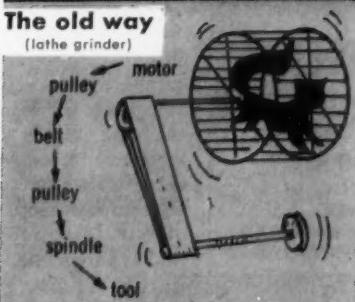
phenolic body with steel blades, as well as inch and metric scales for unusual accuracy. The tool cuts round gaskets $\frac{1}{4}$ to 6 inches and odd shapes and straight pieces of any size. According to the manufacturer, the cutter is ideal for cutting diaphragms, discs, gaskets, patterns and shims from any pliable sheet material, including aluminum foil, asbestos, balsam wood, boxboard, canvas, cardboard, cellophane, chipboard, cloth, cork, corrugated board,



Hargrave Lightweight Handy Gasket Cutter

Take the direct approach to versatile tooling!

The old way
(lathe grinder)



plus vibration, belt slippage & belt wear!

the Precise way



... in one
powerful electric unit,
easily mounted!

REPLACE OLD-FASHIONED LATHE GRINDERS WITH PRECISE POWER QUILLS!

Power Quill is a new name for a new tool that outperforms and outlasts lathe grinders, and saves fortunes through increased tooling versatility! Precise Super 60 Power Quills are unlimited in application, can be used on any machine and mounted in any position to mill, grind, finish, or micro-mill any material with abrasive wheels and tungsten carbide tools. And look at these exclusive Power Quill features:

OPERATE AT SPEEDS UP TO 45,000 RPM, DEVELOP FULL $\frac{1}{2}$ H.P.

CAN FINISH TO 5 MICRO INCHES AND .0001" TOLERANCES ON PRODUCTION MILLING AND GRINDING WITH CARBIDE TOOLS.

MOTOR AND SPINDLE ARE IN ONE COMPACT, DIRECT-LINE, SOLID STEEL PACKAGE WITH GREATER SPEED (45,000 RPM) TORQUE, ACCURACY, AND RIGIDITY.

REMOVE METAL FASTER, BETTER SURFACE FINISHES, INCREASE TOOL LIFE.

MOUNT IN ANY POSITION, ON ANY MACHINE, WITH PRECISE MOUNTS—FAST!

Attach this ad to your letterhead for FREE demonstration or literature!

PRECISE PRODUCTS CORP.

1341 CLARK STREET

RACINE, WISCONSIN

Quality and precision since 1882

Grinder-Millers - Power Quills - High RPM Milling Machines
Mounts and Accessories - Rotary Tools

Precise

For more data circle 532 on Reader Service Card

new shop equipment . . .

duck, emery cloth, felt, fiber, filter paper, fish paper, Hycar, imitation leather, lead, leather, linoleum, mica, millboard, neoprene and other materials.

The No. 415 extension gasket cutter has an aluminum body with steel blades and inch and metric scales. It cuts precision round gaskets of any size ac-

curately and quickly. Sturdy extension arms increase the diameter of the cut to any size.

For more data circle 161 on Reader Service Card

★ ★ ★

NUMBERING HEAD FEATURES QUICK NUMBER CHANGES

The Noble & Westbrook Mfg. Co., 25 Westbrook Ave., East Hartford 8, Conn., has announced the Model 428 Numbering Head, which is designed primarily for stamping nameplates with data that is variable from plate to plate, or for short runs of the same number setup. The head is available in 1/16, 3/32 and 1/8 inch character size. Although the model illustrated here-with is equipped with 11 wheels, the number of wheels is optional. An outstanding feature of this

LUBRICATION ECONOMY

"THIS LUBRICANT INCREASED CHAIN LIFE 4 TIMES!"

ALSO MAKES CARS
AND TRUCKS RUN BETTER
AND LAST LONGER



LUBRIPLATE H.D.S.
MOTOR OIL . . . THE OIL
THAT NEEDS NO
ADDITIONS



DEALERS EVERYWHERE, consult your Classified Telephone Book

For more data circle 533 on Reader Service Card

says FASTERFAT,
Division of National Sea
Products Limited.

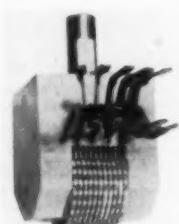
"We switched to LUBRI-
PLATE Lubricants two
years ago and are most
pleased with the results.
High speed chains on fish
meal cookers that formerly
lasted about six months are
now still in service after
two years."

1. LUBRIPLATE reduces friction and wear.
2. LUBRIPLATE prevents rust and corrosion.
3. LUBRIPLATE is economical to use.

Write today for case histories of savings made through the use of LUBRIPLATE in your industry.

LUBRIPLATE DIVISION
Fiske Brothers Refining Co.
Newark 5, N.J.—Toledo 5, Ohio

*The Different
LUBRICANT!*



Noblewest Model No.
428 Numbering Head



TRUE POINT DRILL SHARPENER

for Drills 41 - 60 and
61 - 80 R.H. & L.H.

A properly sharpened drill cuts
faster — more accurately and is
less likely to break.

Write for circular and
full details.

UP-TO-DATE TOOL CO.

P. O. Box 99, Station A, Worcester 8, Mass.

For more data circle 534 on Reader Service Card

Magnetic Base Indicator Holders



Erick
Magna Holder
Model 200B
Only \$5.45

See your dealer or write for
catalogue 755 on the most
complete line of magnetic
base units & access. mfgd.

Precision
adjustment
like surface
gauge

Powerful
50 lb. pull base

CULLEN MFG. CO., RACINE, WIS.

For more data circle 535 on Reader Service Card



**NEISE
MODERN TOOLS**

Model SHU

Sole Agents

KARL A. NEISE, 404 4th Ave., New York 16, N. Y., Dept. MMS

For more data circle 536 on Reader Service Card

A NEW TYPE WALTER PRECISION DIVIDING HEAD

- Operates Horizontally, Vertically
- Easy Handling
- For Quick, Plain, and Degree Indexing
- Versatility Increased by Various Accessories
- High, Long-lasting Precision

Each tool supplied with individual test report.

Max. permiss. error chart supplied with literature.

MAKES Tough SET-UP Jobs EASY

When things go wrong on some particular tapping or reaming operation, and work keeps coming through with oversize or bell-mouthed holes, don't be licked! The main trouble probably lies in the tool holder you are using. Unless it compensates for inaccuracies in set-up as the Ziegler Holder does, faulty work is bound to be the result.

So, if you have a particularly tough job, change over to the Ziegler Floating Holder. You'll be surprised at how it will smooth out your difficulties.

PROMPT DELIVERY



Types to fit
any machine
used for
tapping or
reaming.

W. M. ZIEGLER TOOL CO.

Ziegler

ROLLER
DRIVE

FLOATING HOLDER
for Taps and Reamers...

13566 AUBURN
DETROIT 23, MICH.

• WRITE FOR
CATALOG •

For more data circle 537 on Reader Service Card

new shop equipment . . .

head is the fact that all wheels are stamped with indicating characters to give a direct reading of the setup in order to reduce operator's errors.

In this particular head, levers are

provided to index wheels individually. Depressing and releasing a lever advances the corresponding wheel one division ahead. The head is equipped with 27 division wheels so that each wheel may be engraved with the entire alphabet and blank or characters as required. The tool is ordinarily used in a press in a straight stamping operation and can be equipped with proper shank diameter to suit existing equipment. For more data circle 162 on Reader Service Card



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All standard body styles available with hole sizes from $\frac{1}{8}$ " to $\frac{3}{32}$ ". Tolerances of .0002 maintained on I.D., O.D., and concentricity.

ENGINEERED MICRO-TOOLING, DRILLS,
JIGS, COLLETS, ETC.

MICRO
DRILL
GUIDE



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Cincinnati 36,
Ohio

For more data circle 538 on Reader Service Card

REID

TOOL ROOM ACCESSORIES

C. I. HAND WHEELS



SOLID WEB



COUNTER BALANCED

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Also hand knobs, ball handles, machine handles, etc. High quality. Low prices.

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CAT.**

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MUSKEGON HEIGHTS, MICHIGAN**

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For more data circle 540 on Reader Service Card

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A Complete Line of Clamps for all Purposes

Individually
Power Tested
for Better
Performance



No. 540
Made in openings
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Widths from $\frac{1}{2}$ " to
16". Economical.

WRITE FOR CATALOG No. 65.
Showing Clamps, Chisels, Punches, Masonry Drills for
hand and power hammers, Carbide Drills, Washer
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Stocked by Your Local Distributor.

THE CINCINNATI TOOL COMPANY
1947 Waverly Ave., Cincinnati 12, Ohio

For more data circle 541 on Reader Service Card



STANDARD MACHINE RACKS



The Standard Steel Specialty Company, a pioneer in the machine rack field, has brought an accuracy and finish to this product that cannot be matched by any other company.

This rack is made from special machinery steel finished to our specification . . . cut by expert mechanics on machines designed especially for this work.

Send for our new catalog which gives information on Woodruff keys, taper pins, machine keys, and features a chart for checking machine racks.

STANDARD STEEL SPECIALTY CO.
BEAVER FALLS • PENNSYLVANIA
Plants: Beaver Falls, Pa.; Hammond, Ind.

For more data circle 542 on Reader Service Card

**STUDY....
these outstanding
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New
CHESTERMAN
Vernier
Height Gage**

**The Most significant advance
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ILLUSTRATED FOLDER—Code GIPDU**

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200-MM LAFAYETTE ST. • N.Y. 12, N.Y.

For more data circle 544 on Reader Service Card

April, 1956

Lewthwaite

FRONT LEVER BENCH PUNCHES



These hand operated punches are particularly popular because the die cannot lose alignment with the punch, and because the lever pulls to the front, allowing the operator to see what he is doing at all times.

65 sizes of round, flat, oval, and square sizes of punches and dies are carried in stock for these machines.

Weight: 76 pounds.

68 years of experience goes into every Lewthwaite tool—and it shows!

**SEND FOR CATALOG SHEETS ON OUR
COMPLETE LINE OF METAL-WORKING TOOLS**

T. H. LEWTHWAITE MACHINE CO.

317 East 47th St. • New York 17, N. Y.

For more data circle 543 on Reader Service Card



**Backed by nearly
a half century of
dependable performance**
**. . . yet modern to the minute
for today's exacting demands.**



A\$—58 Tons
Air Clutch
Air Brake
Electric Controls

- Engages smoothly, no sledge hammer blow.
- Inched, single stroke, or continuous.
- Less heat as brake is released when clutch is engaged.
- Less current used; brake is off when clutch is engaged.
- Clutch torque output in direct ratio to applied air pressure and controlled by regulator valve.
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- Clutch is reversible. (By reversing wires on motor you can inch out of stall).

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*Write for illustrated
brochure and
specification sheet.*

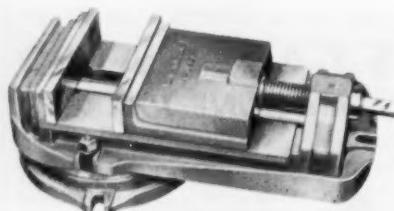
ROBINSON
PRESSES

NEW ALBANY MACHINE MFG. CO.
NEW ALBANY, INDIANA

For more data circle 545 on Reader Service Card

346 modern machine shop

new shop equipment . . .



View of L-W "Mogul" Milling Machine Vise

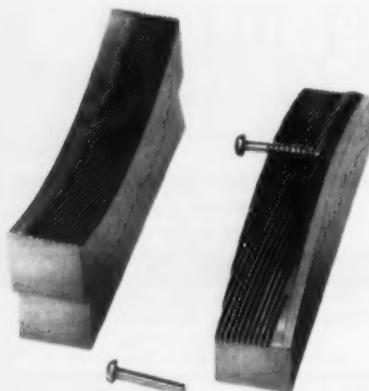
surfaces are ground for unusual accuracy, and the work-holding surfaces are always held at true right angles or parallel to the table. The vise utilizes a large Acme steel screw with replaceable bronze nut.

For more data circle 163 on Reader Service Card

★ ★ ★

PLANETARY DIES PRODUCE WOOD AND SHEET METAL SCREWS

High speed, high volume threading of blanks with a square end by means of planetary dies on Prutton thread



Prutton Planetary Die for producing screws

April, 1956

economically priced press room equipment

DURANT Scrap Choppers

Four models to fit any power press. Employs simple electrical plug installation. Low initial cost. Enables you to get more for your scrap.

Manufacturers of Stock Reels, Roll Feeds, Straighteners, Scrap Choppers, Die Pullers, Foot Presses, Coil Cradles, Press Guards, Stock Oilers.



WRITE FOR NEW FREE CATALOG

DURANT Tool Supply Co.
PROVIDENCE 3, RHODE ISLAND

For more data circle 546 on Reader Service Card



Executive head of large plastics firm

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"Before we switched to ESSEX tools, we spent \$45,000 yearly for high speed burrs. ESSEX carbide burrs, made to our specific needs, cost us only \$18,000 — an annual saving of \$27,000!"

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MMS-46

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Company _____

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Zone _____

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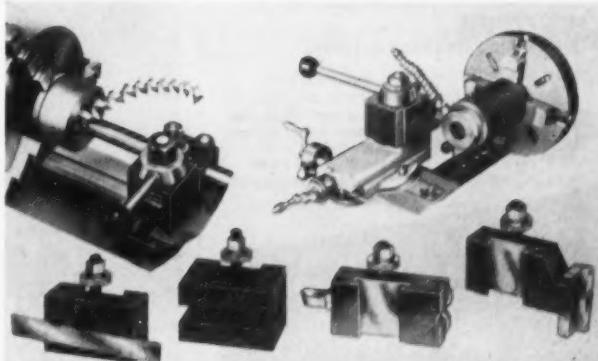
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GET THE MAXIMUM FROM YOUR LATHES by using the ALORIS "Quick Change" TOOL POST and HOLDERS

Only a second to change tools for turning, facing, drilling, boring, threading, knurling, cutting off or any other operation.

- GREAT REPETITIVE ACCURACY.
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- TESTED AND RECOMMENDED BY LEADING LATHE MANUFACTURERS.
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SIZES

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MILLING MACHINES

POWER

SPEED

MANUFACTURED

by highly skilled specialists

PRECISION

ECONOMY

- Power rapid traverses in all directions
- Wide range of speeds and feeds
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348 modern machine shop

new shop equipment . . .

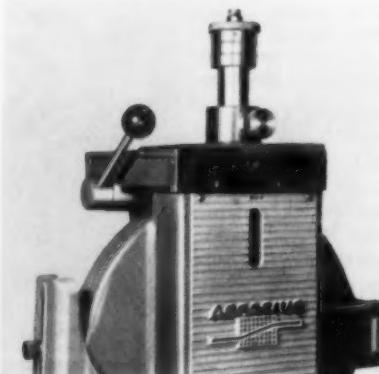
rolling machines has been announced by Prutton Corp., 5295 W. 130th St., Cleveland 30, Ohio. According to the manufacturer, the planetary die system can roll precision screw threads formed to an end point. It handles plain wood screws, Twinfast wood screws, and Type A and B sheet metal screws in all sizes and shapes at regular production runs up to 25,000 pieces per hour. The dies are in sections inserted into a planetary holder.

For more data circle 164 on Reader Service Card

★ ★ ★

BUILT-IN WHEEL DRESSER FEATURES MICROMETER ADJUSTMENT

Abrasive Machine Tool Co., East Providence, R. I., has designed and offers, as optional equipment on their line of hydrabrasive precision surface grinders, a built-in, hand-operated wheel dresser. Engineered to rigidly fit into the grinder head, the wheel dresser features a micrometer adjustment that accurately measures and controls the amount the wheel is dressed. With this



View of Abrasive Built-In Wheel Dresser

April, 1956

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The most economical LEAKPROOF,
LIGHTWEIGHT, DRAWN TOTE PAN offered to industry

OUTSIDE DIMENSIONS

DEEP — 5½"

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WIDE — 10½"



There Are 25 Nested Tote Pans in Above Photo.

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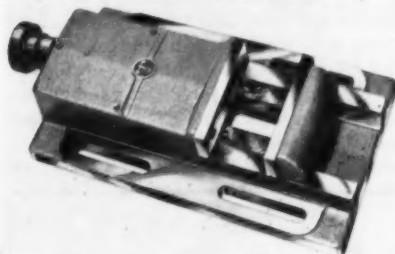
BATHEY MFG. CO.

100 SO. MILL ST.

PLYMOUTH, MICH.

For more data circle 550 on Reader Service Card

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• UNDERDRAW CONSTRUCTION

No Lifting of Jaws

Faster Clamping

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• HIGHER ACCURACY

Various Types: For Milling
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Quick Clamping Vise

With and Without Swivel

Highest Precision Toolmakers'
Universal Vises also available

NEISE
MODERN TOOLS

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For more data circle 551 on Reader Service Card

April, 1956



The Past...



The Present

The Future—

The slow steps of the past
are gone . . . for the present, the
future, get better production and
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Spindles.

Equip your new Surface
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for easy adaptability and for modernizing
your old machines.

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for today, tomorrow . . . and for high
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regardless of wear or temperature
changes, and the sealed-in lubrication
requires no attention. Whitton
Spindles assure micro-finishes . . .
the Spindle assembly is precision
balanced on its own bearings, which
are the most accurate obtainable.

The present, the Future, and
Whitton Spindles . . . all teamed
for you.

Whitton

THE MANUFACTURING COMPANY

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For more data circle 552 on Reader Service Card

modern machine shop 349

new shop equipment . . .

device, an operator can quickly dress a wheel without having to disturb his work or machine setup.

For more data circle 165 on Reader Service Card



WORK BENCH FEATURES CONVENIENT STORAGE BASE

A cabinet base work bench for industry has been announced by Parent

Simplify preventive maintenance with—
MACHINE TOOL RECONDITIONING
& the Art of Hand Scraping
New 2nd printing
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For more data circle 553 on Reader Service Card



View of Parent Cabinet Base Work Bench

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For more data circle 166 on Reader Service Card

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You really get your money's worth when you buy precision screw machine products made by "you know W.H.O.*"

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SET SCREWS • MILLED STUDS
... our specialty.

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YORK, PENNA.

For more data circle 554 on Reader Service Card

350 modern machine shop

GRIND THE Eastern Centerless Way

Our new plant with
increased facilities

assures

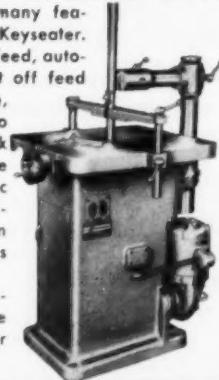
PROMPT SERVICE
Eastern Centerless Grinding Co.
470 Tolland Street East Hartford 8, Conn.

For more data circle 555 on Reader Service Card

April, 1956

MORRISON 1" AUTOMATIC KEYSEATER

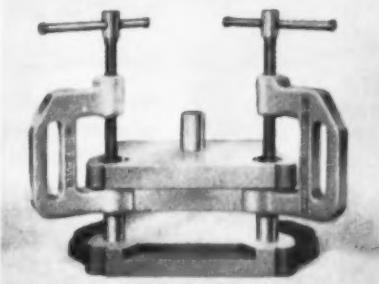
Investigate the many features of this new Keyseater. It has automatic feed, automatic stop to cut off feed at given depth, automatic relief to back the work away from the cutter, automatic centering, automatic lubrication and no bushings required. Write for more information on the finest Keyseater on the market.



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P. O. BOX 1017B • CINCINNATI 1, OHIO

For more data circle 556 on Reader Service Card

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press room equipment*



DURANT Die Set Pullers

Easily removes punch holder from die shoe by a straight upward pull, yet protects the die set. 3 Models fit all sizes of die sets. Priced from \$18.00 per pair.

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DURANT TOOL SUPPLY CO.
PROVIDENCE 3, RHODE ISLAND

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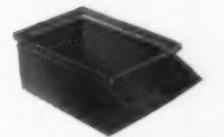
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Sterling
Quality Handling & Storage Equipment

For more data circle 558 on Reader Service Card

where to get it

where
to
get it

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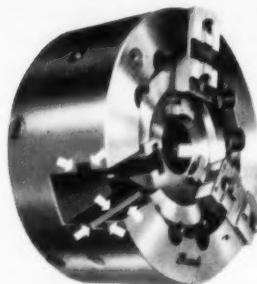
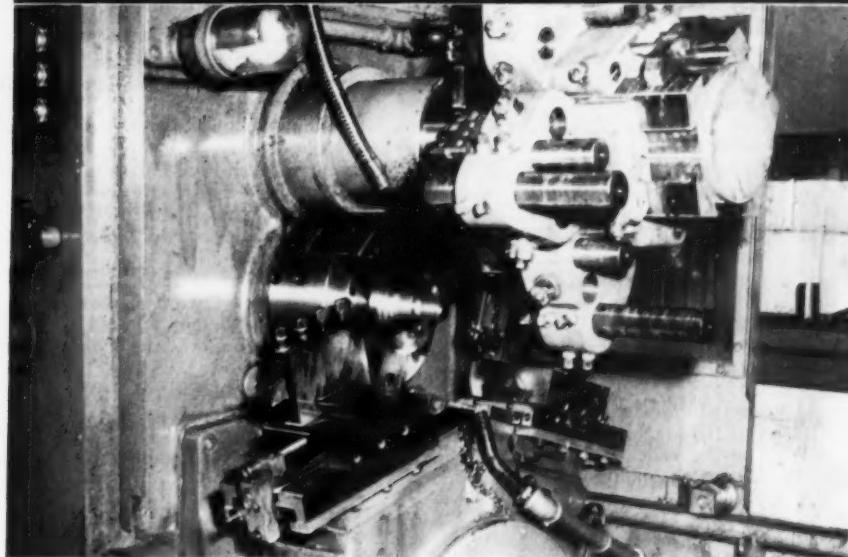
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Buck Chuck—"Saves an hour each set-up"



Hardened key ways standard.

"Eliminates Top Jaw Fabrication On the Production Machine..."

Ed Kazmirski, owner Kay Mfg. Co., Lansing, Ill., reports on his Buck Ajust-Tru Power chuck experience on six spindle automatics.

Job shown is held to .001" T.I.R., I.D. concentric with O.D. Top jaws are machined on turning fixture (available with the Buck at low cost), and hardened. Fixture is then used to grind to size, eliminating fabrication on the production machine.

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Are set-up savings important in your shop? Write for details on *all* the Buck chuck features.

Buck
AJUST-
TRU®
AIR
CHUCKS

BUCK TOOL COMPANY
414 SCHIPPERS LANE • KALAMAZOO, MICH.

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Brightboy is available for *QUICK DELIVERY* in wheels as well as in a full range of accessory products—rods, sticks and blocks—for machine and manual operations.

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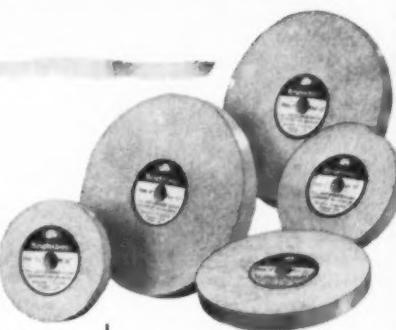
Each in combinations of grain sizes and textures from extra fine to extra coarse, in soft, firm and tough rubber binders.

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WELDON ROBERTS RUBBER CO.
95 North 13th Street • Newark 7, N. J.
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Abrasives

For more data circle 560 on Reader Service Card

April, 1956

modern machine shop 355



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Removing light digs, tool and heat marks. Cleaning and smoothing welded and soldered joints. Burring and finishing castings, molded and machined parts.



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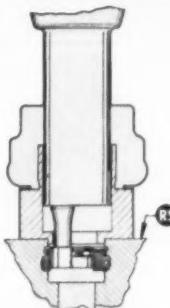
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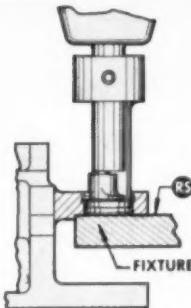
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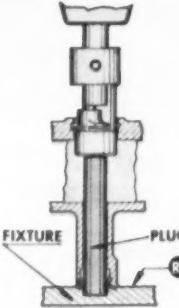
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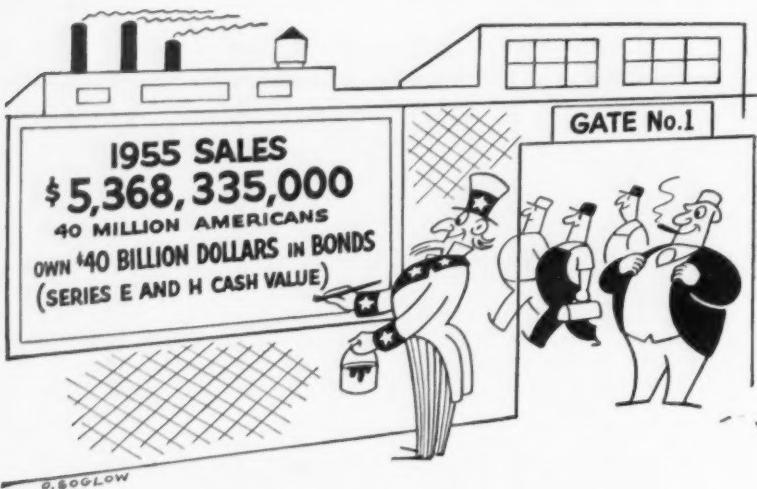
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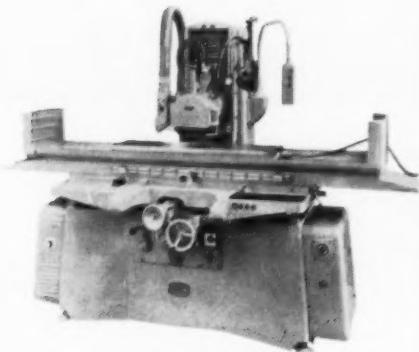
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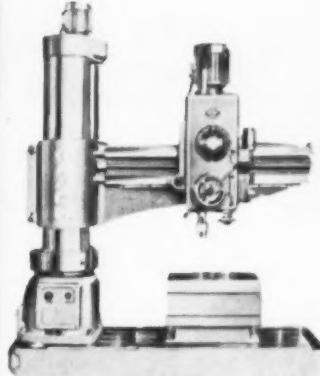
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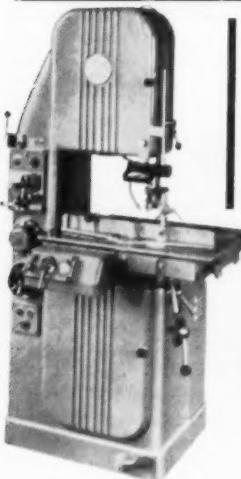
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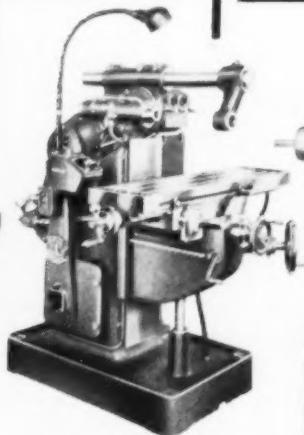
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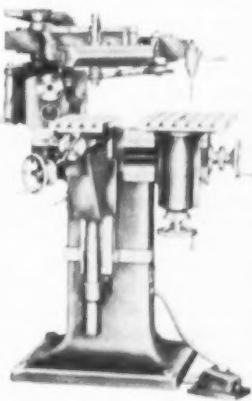
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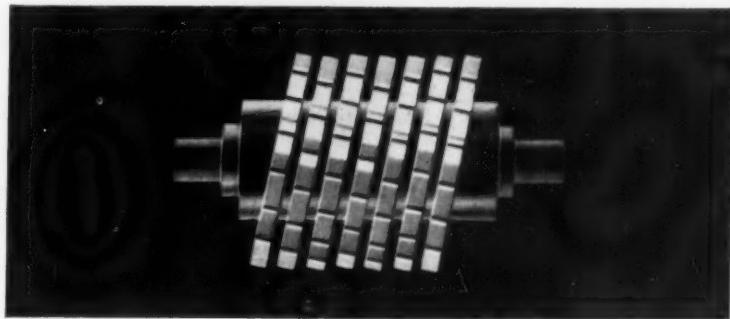
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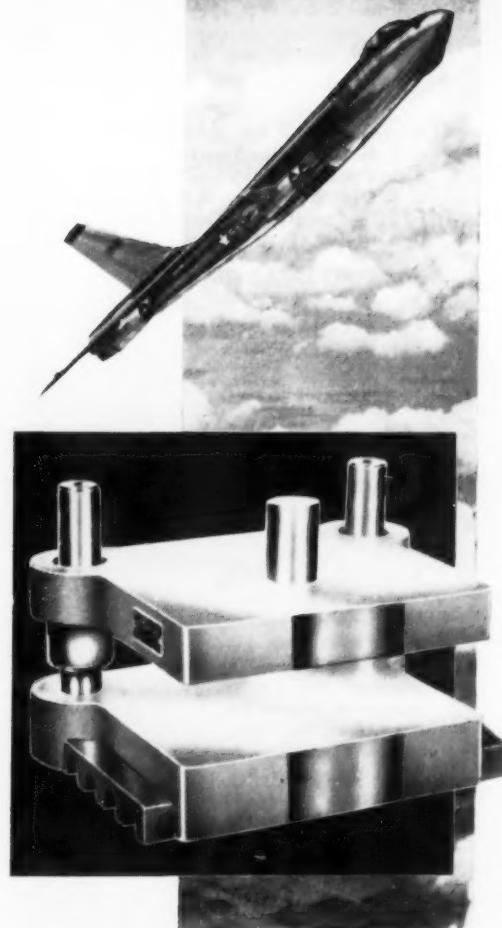


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April, 1956

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Are you having TROUBLES in your Drill Department?

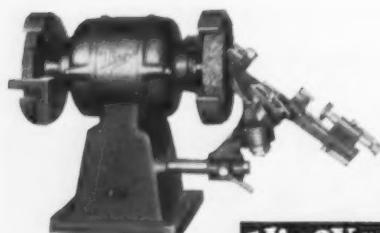
Following are some of the most common and their causes:

Trouble	Cause
Oversize holes.	Unequal lip length.
Drill burns—will not cut.	Insufficient clearance.
Cutting edge chips or crumbles.	Too much clearance.
Outer corners of lip break down.	Speed too high.
Excessive wear on margins.	
Rough holes.	Speed too slow or
Drill breakage.	Feed too heavy.
Drill point crushes.	
Broken tangs.	Dirt or chips in socket or worn out socket.

Most of the above can be overcome by using a precision type Drill Grinder. A Hisey Drill Grinder will quickly pay for itself when you consider that drills that are correctly ground and kept sharp will (1) drill faster, (2) drill more holes per grind, (3) drill to exact size, (4) reduce breakage, (5) increase life of drill by removing less metal when sharpening.

A Hisey Drill Grinder will grind drills quickly and correctly with inexperienced operators.

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Hisey THE HISEY-WOLF MACHINE CO.
CINCINNATI & OHIO
Division of The Cincinnati Electrical Tool Co.

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Cincinnati 2, Ohio**

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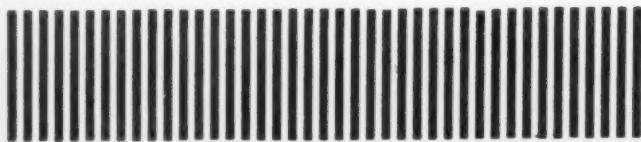
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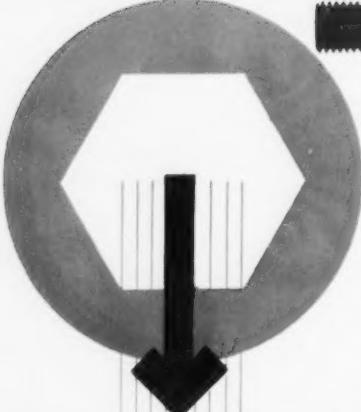


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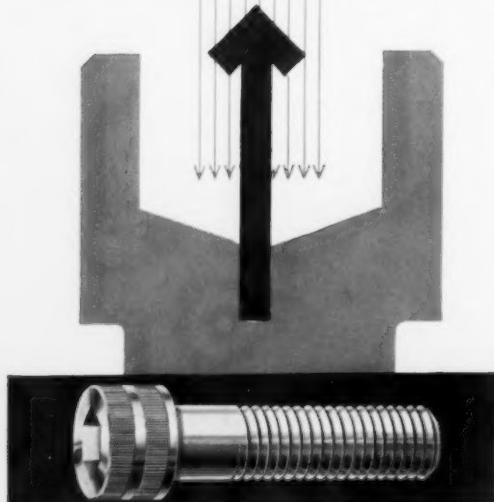
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